INDUSTRIAL-ARTS MAGAZINE

Vol. II AUGUST, 1914 No. 2

A TYPICAL DAY CLASS OF GIRLS, "PERMIT WORKERS," IN THE MILWAUKEE CONTINUATION SCHOOL.

SCHOOLS AND CONTINUATION SCHOOLS

Robert L. Cooley, Superintendent of Continuation Schools, Milwaukee, Wis.

THE first task immediately before the school authorities of this country is the modification of the elementary schools as to courses of study and methods of teaching. The next important thing is the establishment of schools for the people of the community who are employed.

For the latter, in Wisconsin, we have legislative authorization; a measure of legal compulsion for apprentices and workers under 16 years of age and a half mill on each dollar of the assessed valuation of the city school districts to support the work.

The work is carried on under an independent board and is unhampered by salary schedules, certification requirements, traditions as to vacations, hours, equipment or methods of teaching.

The Work of the Elementary School.

What we can do in our continuation schools is determined, in a measure, by what the elementary schools last attended by these workers did or did not do for them. I do not believe that the condition of the young workers upon leaving the elementary schools in Milwaukee are materially different from those to be found in any large city, and certainly not materially worse. I likewise believe Milwaukee has one of the best elementary school systems in the country, and that the elementary schools all over the country are better today than elementary schools have been in our history. And yet, I

believe that all too much of the ore dumped into our educational smelters proves refractory and that an intelligent study of our smelting processes with a view to their improvement is our elementary school's greatest need.

Sixty per cent of the boys and girls who quit the elementary school and go to work at 14 years of age have not completed more than the sixth grade. Of these practically all are poor readers, poor spellers, inaccurate in their mathematical processes, and apparently without the general knowledge which they could reasonably be expected to possess in view of their age and years in school.

A man remarked to me the other day that he was not able to get on in school; he could only learn in the school of experience. The remark struck me with a new significance. He thought of himself as an exception, and, in view of his success in business, spoke of the fact with a touch of pride. On reflection, however, it seems probable that the same is true of one-half of our pupils, and, in only a lesser degree of the other half.

Experience is a great teacher. It pays to study its method. It is true in life that an experience which would have saved money may come after the loss has occurred; from the standpoint of a financial transaction, it may be a failure, but as an instance of effective teaching the incident is certainly successful and suggests a method it would be well for us to observe. When experience teaches, the lesson is always motivized. The pupil nearly always realizes the usefulness of the thing to be learned and hence to him it is important at the time. Experience always presents a concrete case to its pupil. Experience always presents what comes within the life of the pupil. Experience always teaches what it uses, and uses what it teaches. In the school of experience the pupil always feels that he is learning. If I were to criticise our elementary schools in general terms, I should say they are not sufficiently "schools of experience," and were I to offer the suggestion I think most vital to their improvement, I would say: Our elementary schools must be made more and more schools of experience.

Lessons From Life.

A little nine-year-old girl, at the breakfast table the other day, asked her father to drill her in the table of liquid measures. He did so. "Four quarts—one gallon; 2 pints—one quart; 4 gills—one pint," she correctly said. Before her on the table stood a tumbler about one-quarter filled with water. How much water have you in your glass?" the father inquired. "One quart," the child promptly replied.

Asked to draw a half-inch line on the blackboard, a perfectly normal fourteen-year-old boy drew a half foot.

These illustrations are not extremes. All too many of our elementary-school pupils have not been able to learn by the methods used in the ordinary elementary school. Many have gotten on fairly well. I am sure, however, that in the school where reasonable effort is made to precede the lesson by or accompany it with experiences suitable to the age of the child, all pupils will learn more readily and have what they know "on tap." Why did the little girl not know a gill from a quart, or the boy know a half inch from a half foot? The answer is found in the fact that they simply had never measured anything. Their knowledge to date was utterly useless and unconnected with anything in their existence. Not to multiply instances, it cannot be gainsaid, too many of our schools continually teach just that way and get just the result obtained in the instances mentioned.

To succeed, the school must be life, and must have brought into it the necessary experience, so that the child will as truly be learning in the school of experience, while in school as will be the case when he leaves.

Modifications That Are Necessary.

I am not arguing against children being set a task and held to its mastery, but I do insist that the tasks must, in the main, be co-ordinated with the children's experiences. This means that the life of the child in play and work must be studied, and, in a measure, controlled; and the lessons of the classroom based upon, and the method of the recitation modified by, that life. Disagreeable tasks and uninteresting ones must be performed from a sense of duty and out of respect for authority, but in such cases the task so performed must be because the pupil and not the teacher feels the compulsion of duty, and because the pupil respects rather than fears the authority exercised over him.

I believe the elementary schools must be modified in their material equipment so that the playground, the workshop and the laboratory will furnish the activities that will largely use the education the child acquires from day to day. I believe the courses of study must be so modified as to draw their content from the playground, the home, the shop and the laboratory. I believe the teachers must obtain their method of teaching from the observation of how grown people and children learn the things they do learn outside of school. The teacher in the elementary school will then "put across" what he attempted to teach.

When that is done, it will be possible for the work of the Continuation School to be other than it is today.

The Work of the Wisconsin Continuation School.

The work authorized by our recent legislation in Wisconsin is that of affording educational facilities for all people who desire to study along commercial, home-making and industrial lines—whether in part-time or evening schools.

Two compulsory groups formed the major part of our attendance during the first year, viz., the fourteen to sixteen-year-old "permit" worker and the legal apprentice. Evening classes were also offered and largely attended. I will discuss these in the reverse order in which they are named, and but briefly.

In the evening classes, English for Foreigners made up the largest group. The desire to learn the English language was the major motive in the minds of those attending. It would be wrong, however, to permit the impression to prevail that these people were not eager for our American history or appreciative of our American ideals. The language teaching was made the vehicle for lessons in history, civics, hygiene and industrial geography. The next largest groups were the women in

DAY CLASSES OF "PERMIT" WORKERS AND APPRENTICES.

sewing and cooking classes, the journeymen in mathematics and mechanical drawing, estimating and contracting, gas, electric and steam stationary engineering for people working in such positions, printing, architectural drawing, bookkeeping, stenography and commercial law for young businessmen. Continuation classes were also formed for young people who wished to continue their elementary school studies. No one under 16 years of age was allowed to attend.

The work with our apprentices is entirely day work, the attendance compulsory and upon the time of the employer, the boy receiving pay from the employer while in school. The only apprentices we recognize in Wisconsin are the legal apprentices. There are supposed to be no other. The Industrial Commission, which has charge of the enforcement of the apprenticeship law, has, wisely we think, moved slowly, thus permitting the school to feel and win its way. We now have

190	Machinist Apprentices
52	Patternmaker Apprentices
14	Printer Apprentices
22	Bricklayer Apprentices
30	Baker Apprentices

Adaptation to the Trades.

In establishing apprenticeship schools each trade is studied with a view to finding out just what sort of equipment and instruction is necessary to supplement the opportunity of the apprentice in that particular industry. If it needs shop or laboratory equipment in the estimation of the practical men who have been handling the apprentices in that industry, such equipment is provided. To illustrate:

We teach the bakers' apprentices the growth of yeast and how a certain temperature is best for its development; what happens when we go beyond this temperature and also what the results of too low a temperature are.

In practical experience many cases may contribute towards unsatisfactory results and young men are seldom able to observe the changes any one cause may produce. In the school we are able to make and treat dough alike and then vary therein in a single item and enable the boys to observe and become familiar with the results of that particular item.

We will, let us say, make a dough for bread. Part of this dough we permit to ferment for an hour, then pan, proof and bake; result, immature green bread. Another part we permit to ferment for an hour and a half, producing some changes in the loaf; then, two, two and a half, three, four or five hours, when we may perhaps have the best flavored bread. Then five and a half and six hours. We now can show how yeast has eaten the life out of the flour; how instead of merely softening the gluten therein to make it more palatable and digestible begins to decompose and rot it. In six and a half, seven or eight hours we can show how the yeast has degenerated and given place to acid fermentation, souring and spoiling the loaf. We can prepare a dough at say, 50° F., and note how the yeast cells weakly struggle to obtain food, how they are not strong enough to cope with other forms of bacteria life present in the dough. In another dough we produce conditions exactly like those but raise the temperature to 60° when the yeast will take a better hold. Then 70° in one; the next—the very best for use—80°; then 90°, when we begin to be on the way to the other extremes, giving acid ferments the upper hand and finally at 105° and 110°, making it "too hot" for the yeast and almost killing it off.

Teaching Mastery of Materials and Processes.

Or, treating the matter from another angle, we can show how one flour must be treated differently from another to bring about best results. We can demonstrate one where we are sure fermentation and other things are correct and still the bread is not of the best quality, that the gluten in the flour is stronger and may require a little more fermentation, or, weaker and cannot be subjected to the same conditions. This will educate the boys to examine and judge flour and accord it the treatment best adapted for its individuality to bring about the best results.

The same idea of instruction can be followed in the use of salt, sugar, lard, malt extracts, etc. In short, all the articles used in the bakery, as well as the different modes of working, are treated in a similar manner. We take a dough and by manipulating it differently, working it differently, moulding it differently and proofing it differently, produce different results and

at the same time always keep the effect and the result directly before the eyes of the pupil.

Now, all these problems occur in the bakeries, where the apprentice works, from time to time. In the way in which they occur, however, they tend to confuse rather than enlighten the apprentice; they fill his mind with doubts and misgivings rather than certain knowledge as to just what occurs. He only sees the effects and is often entirely in the dark as to the cause. In the commercial life neither the time, the knowledge nor training necessary for lucid explanations are available to the boys. We show them the cause and effect; teach them how to be masters of the situation and control the work rather than be slaves of circumstances and trying to grope their way to a clear understanding.

Other Part-Time Classes.

We also have part-time day schools for druggists and saleswomen, and will establish others as fast as the need is seen or the demand arises.

Our druggists come two half days a week and are taught in our laboratory by a competent druggist.

A class of young women from the department stores comes one-half day each day for a period of three months and are taught by an experienced saleswoman, who has had special training for the work in Chicago and in Boston under Mrs. Prince of the Woman's Industrial Union. In addition to conducting this class, some of our teachers go out to the stores until 9:30 A. M. to meet larger groups of clerks for the discussion of their store problems.

Now we come to the largest and probably the most important group of all—the 14 to 16-year-old boy and girl, who at 14 usually leaves the school, as I said before, at about the sixth grade and goes out into industry with too little education to continue self educating, with too little of either age experience or education to be of much value to their employer in any save the jobs that have no future in them. I need not describe these jobs. You are familiar with them. They have been surveyed, listed, counted, classified and possibly magnified.

The Hopeless "Dead Ends."

It must be remembered that there are "dead end" children as well as "dead end" jobs. Most of us who have had to hustle for ourselves have occupied "dead end" jobs. To the boy who is not a "dead end" boy such a job is merely a place to rest his lever, a fulcrum, which will enable him to move his world. Such a boy may be able to get on without the continuation school, but he is worthy of it, and will repay the community many fold for the opportunity if it is given him. For the other fellow who has been chloroformed, or rather submerged, by the elementary school and the social and economic conditions of his home and is about to go down for the traditional third time, the continuation school must be a life preserver and pulmotor. The community owes it to itself to save this child, to revive his ambition, stimulate his imagination and instruct him how to live respectably upon the wages likely to be earned as an unskilled worker in the social body. The experience of one is no criterion. One may escape to the ranks of the skilled worker or make a fortunate matrimonial venture, but the fate of the thousand is always the same. The girls will marry soon. In three or four years most of them will be rocking the cradle, doing the purchasing for a family, supported by the wages of an unskilled workman. If that is so, clearly they must be taught to cook and sew. They must be taught the economy of quality and must be led to grow in appreciation of color and design in personal dress and home equipment and arrangement. Fortunately nothing we can do for these young people meets so ready a response. This work is related rather to their age than their previous attainment in school and they take to it and do it practically as efficiently as tho they were of the grade in school suited to their age.

Bettering the Home Thru the Child.

It has been argued that the work indicated above is not the kind the employers rightfully demand in view of the interruption of their week's work by the demand for attendance at school and it is true that some of our exployers do not exactly get our point of view.

"You don't use judgment," said one manufacturer to me. "You take these people out of our factory just as you do out of other factories where nothing is done for them. We have done everything for these people's comfort and convenience. Why? Conditions in our factory are better than the conditions in the homes of these people."

"Yes," I replied, "but the conditions in the homes of these people must be made better. What elements make up the conditions in the homes? As I see it they are two: The wages you pay and the intelligence with which these wages are expended. The conditions of these homes must be bettered. Industry exists only for this purpose. Higher wages or more intelligent spending seem to us to be the only remedies. Which remedy seems to you to be the most promising and which do you want emphasized?"

In addition to the above, we strive to save the investment the community has already made in the education of the child thru academic reviews and reading. We have one teacher who devotes her whole time to connecting these girls with the public library. Hundreds of selected books are being sent out among these girls where investigation shows no books ever went before. This, I conceive to be—in moral value—one of the best pieces of work we are doing.

Pre-vocational Work for Boys.

Our "permit" boys are given one and one-half hours of shop work, one and one-half hours of mechanical drawing and one hour of related academic work each week. This work is given only to boys, who speaking by the hundred, are certainly to earn their living in unskilled mechanical work. We have wood shops, electrical shops and metal shops, the work in which has been largely such as would be done in any manual-training shop of the same kind. Boys are shifted thru all of these shops. Practically all of our boys have no manual training, for manual training is not commonly given in the parochial schools, except by arrangement with our public school system, and unfortunately in our public schools manual training is related, perhaps necessarily, to the grade of the boy in school rather than to

his age. A sixth grade boy 14 years of age will not have had manual training. Most of these boys, as life in the city is constituted in their economic stratum, have never held in their hands a hammer, a saw, a chisel or a plane.

We have about concluded our arrangments to group the boys more definitely according to their expressed wish relative to their future occupation. It will be possible, as we now have our school planned, to give the boys definite prevocational work in the following trades:

1. Carpentry.
2. Cabinetmaking.
3. Patternmaking.
4. Tin Smithing.
5. Sheet Metal Work.
6. Plumbing.
7. Steamfitting.
8. Electrical Work.
9. Masonry.
10. Machinist.
11. Concrete Work.
12. Power Plant Operator.
13. Drafting.
14. Bookkeeping.
15. Store Clerking
16. Stenography.
17. Printing.
18. Baking.
19. Painting and Decorating.

To illustrate: A boy wants to be a plumber and so expresses himself. Unless he is physically incapacitated, or has special talent which makes another choice of occupation, obviously better, we shall take him seriously. We shall acquaint him with plumbers' tools and plumbers' findings. We shall have him call tools and fittings by their right names, have him put up orders getting shapes and sizes correct and do simple bookkeeping, involving spelling of names and a knowledge of prices of plumbing work and supplies. Simple shop work will be provided and the conditions of the trade studied. The immediate object will be to get the boy to take his own wish to be a plumber seriously, to aim to soon get into the work he ultimately expects to follow even at an immediate loss. We shall try to get the boy to value an apprenticeship contract and demand one.

General Utility of Courses.

While this boy is working with singleness of purpose in the shop, we shall so shape his work in mechanical drawing that it will be of value to him in any trade or occupation he may ultimately follow. To that end simple lessons in architectural, mechanical, sheet metal and freehand drawing are provided. It is a well-known fact that chance, in spite of all we may do, will be a large factor in determining where the boy will land in seeking a job. He may be seriously wanting to be a plumber, but chance gives him the opportunity to be a sheet metal worker. Our work must be of such a nature that it will help him even in that event.

In these first years after leaving school, we are trying to save the investment in education already made in young people in the elementary school, to add to it, and to give them an experience and a knowledge which will change their attitude toward apprenticeship and stimulate their desire to acquire skill that will have a higher value than the labor they now have for sale. If they cannot become apprentices, they must at least be led to contemplate a man's job.

The homemaking ability of the boy must not be lost sight of. None of these boys can hope, as fathers of families, to get beyond the necessity of pinching economy. They will not be able to hire a carpenter to put up a shelf for their wives or a plumber to fix the faucets or clear out the drain any more than their wives will be able upon their earnings to hire a cook. Show me the man who is a considerate homemaker for his family, whose home shows his handicraft, and I will show you a good citizen. This much that is fundamental to their needs we must give them, and, fortunately, in the giving, the work can be made the best kind of vocational guidance.

I have but little faith in the kind of vocational guidance that meets the boys one at a time, looks them over searchingly, squints the eye and pronounces the verdict. The ambitions that are stirred up in the boy, the reach of his imagination and the opportunities that come his way are the elements that will decide. The boy who does not know opportunity when it comes his way will take the $5 per week job with no opportunity as against the $4.50 job that offers a chance to learn and rise.

Masters are willing to apprentice more boys than they can get and many a boy who is a helper could obtain an apprenticeship contract did he but value it and demand it. As I said before, we are trying to change the attitude of the boy toward apprenticeship, not in the expectation that all can become skilled workers, but in the hope that all who can, will do so.

An Evening Class in Cookery.

Machine Design Class in an Evening School.

THE SECOND LARGEST GROUPS IN THE EVENING CONTINUATION SCHOOLS "WERE THE WOMEN IN SEWING AND COOKING CLASSES."

For the office boy who is clearly not going into mechanical employment we offer typewriting, stenography and bookkeeping.

When we discover special talents in boys we call their attention to the occupation in which such special talent would be an asset, and in which, due to these particular talents, they would most likely be most successful and contented.

Vocational Character of the School.

All thru the East we are asked "Is the work you do 'vocational?'" Or rather more often we are told "The work you do is not vocational." In reply I can say that most of the work we do outside of the fourteen to sixteen-year-old group is clearly vocational judged by any standard. Fortunately, our Wisconsin law has not limited our efforts to "vocational" work nor attempted to define what constitutes "vocational" work. We are permitted to analyze the needs of these boys and girls and go in our teaching where the facts lead us. There is an identity of interests between these thousands of young people and the industries of the community. The best interests of the industries of the community do not require their exploitation, but the opposite. Employers have been fully consulted and I have yet to find one who asks that these fourteen to sixteen-year-old boys and girls be taught specialized processes. I am universally told by employers to make these young employes more intelligent and more responsible; to make them more reasonable and reliable and teach them to look to their future. Is it necessary?

I give below a couple of cards drawn from our files.

A girl 15 years of age:

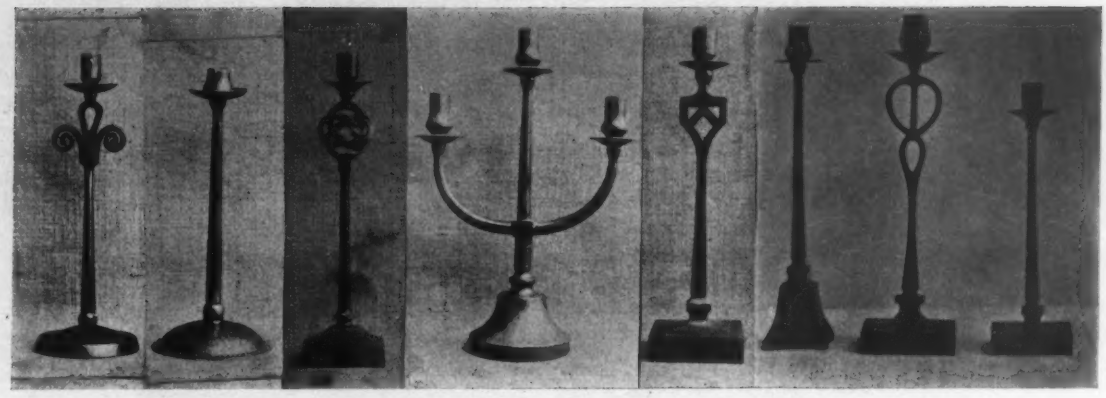
September 17, 1913	Western Leather Co.
October 1, 1913	Badger Candy Co.
October 3, 1913	O. C. Hansen Mfg. Co.
October 8, 1913	Unemployed.
October 9, 1913	Robt. A. Johnston Co.
October 19, 1913	Campbell Laundry Co.
March 10, 1914	Unemployed.

A boy 15 years of age:

April 21, 1913	Morawetz Company.
July 9, 1913	Unemployed.
July 12, 1913	Cutler-Hammer Mfg. Co.
July 25, 1913	Unemployed.
August 2, 1913	P. G. Braun Glove Co.
October 2, 1913	Unemployed.
October 3, 1913	F. Eder Fur Co.
January 22, 1914	Unemployed.
January 27, 1914	Pepak Bros. (Trunks & Traveling Bags.)

It is from the ranks of those who leave school early that these unskilled workers of our community are most largely recruited. The condition of the unskilled worker is the big problem before us today. If the unskilled workers of the country could have in their pay checks the saving and increased earnings that would accrue from sobriety, reliability, responsibility and increased intelligence, all of which is reasonably within their grasp, if the industry could be relieved of the incubus of inefficiency and interrupted work due to the "floating" and other labor troubles due to ignorance and suspicion, unskilled work could be made to yield a living wage, which if not freely given, the workers could reasonably demand and obtain. There is an identity of interests between the employer and employe, and this identity, tho seen but dimly, is emerging to view. To illustrate: Shoes go out of one door of the factory and men out of the other. It is seen that just as surely as men make shoes the making of shoes makes men. Shoes that are made at the price of men are made at the price of the home market. Any employer who pays his workers so little or works them so long that his employes cannot consume normally is not fair to the manufacturer of clothing or other articles of common use. He restricts the market as truly as tho he were to sink a populated area to the bottom of the sea. The unskilled worker does not so much need greater skill as he does the development and conservation of the qualities mentioned above. The education of the workers that contributes to this end is industrial education. Let the critics debate whether or not it is vocational.

Note—The foregoing paper constituted the basis of addresses delivered by Mr. Cooley at the convention of the Corporation Schools Association, Philadelphia, and of the National Education Association, St. Paul.



CANDELABRA DESIGNED AND FORGED BY MR. GOOGERTY.

ART SMITHING

Thomas Googerty, Pontiac, Ill.

(First Article)

AT the present time great interest is being taken in the teaching of art work in our public schools. Every school of importance is doing something in the way of giving the pupils a knowledge of art. One working in the school crafts should study art. There is no craft work that one can do well without this training. With art training one can see defects in his work much quicker than without such training. In fact, it opens up a new world of possibilities to the workman. The more one is convinced of the value of thoro acquaintance with the medium in which he is working, the higher the class of work he produces.

All fine workmen in any craft have more or less ability to draw. This not only gives them power to transfer their conceptions to paper, but it also helps them in the execution of the work. The iron-worker in particular should practice free-hand drawing. It enables him to form his material into proper shape. As a general thing, forge work is fashioned into shape by eye.

Wrought iron-work is one of the oldest of the handicrafts. It was extensively practiced by the ancients and carried to a high degree of excellence, both in execution and design. During the Middle Ages and up to the seventeenth century some of the finest examples were produced. A study of the older forms, especially those of Medieval German production, shows iron fashioned in keeping with its properties and with the spirit of the craftsman. It is impossible to utilize natural forms in wrought iron without convention. Realistic iron flowers are inconsistent with the material in which they are executed. They kill the strength and destroy the character of the metal. This should be learned early by one working in iron. When the iron-worker of the past imitated nature too closely in leaf and flower, he failed as a designer and his work deteriorated. Iron as a crude metal must be fashioned into shapes that are suitable and practical for the material. For instance, it readily allows itself to be worked into graceful curved forms which can be used to advantage in grille work. It may be surface-decorated by using chasing tools, which is done on hot or cold metal, depending on the

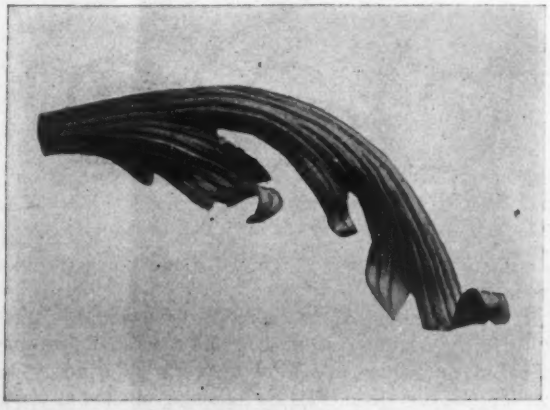


Fig. 1. Forged Leaf.

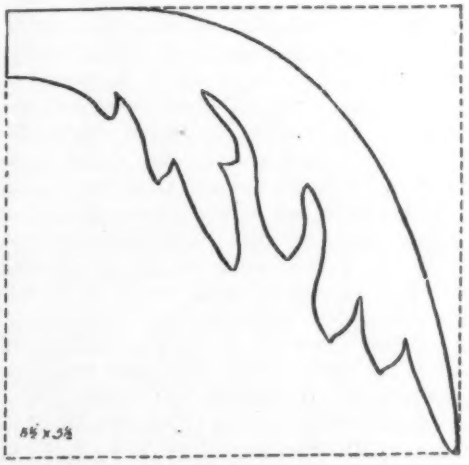


Fig. 2.

depth wanted. Iron may also be punctured with openings thru the metal which give a play of light and shadow that is very pleasing. Grotesque figures may also be worked in iron and an endless variety of leaf forms which should be conventionalized. Embossed or repoussé work may be done to advantage. In doing this the metal while hot is hammered on the end grain of elm wood and on forms made from iron. When cold it is hammered on lead, and steel tools are used to sharpen up the detail.

In Figure 1 is shown a leaf made from Number 16 sheet steel and Figure 2 shows a pattern of the same leaf. In making a leaf of this kind, a full-size drawing is made just as it should look when modeled. From this drawing a pattern is developed as the leaf would look when in the flat. It is impossible to lay it out accurately. The method used is to find the stretch out of

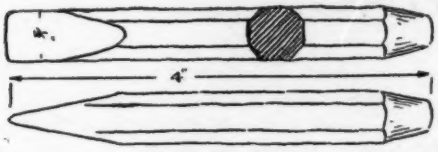


Fig. 3. Cutting Tool.

the leaf by measuring along its greatest length. This can be done by using a pair of dividers. The length found is then laid off on the metal. The widest parts of the leaf are then measured and laid on the metal. Having the length and width the rest can be sketched in. The leaf is now cut out with a narrow cold chisel that can be made to follow the curved line. This cutting should be done while the metal is cold. The leaf shown in the illustration has been fluted with a steel hand-tool. In doing this a tool as shown in Figure 3 is used.

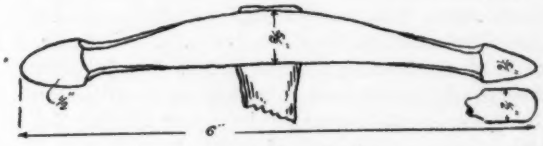


Fig. 4. Modeling Hammer.

This tool is made smooth, rounded at the base like an ordinary fuller and then hardened. The fluting is also done while the metal is cold. Lines are marked on the metal with a slate pencil and then sunken with the tool and hammer. In modeling the leaf a hammer like the one shown in Figure 4 is used. It is called the modeling hammer. This hammer has a ball on one end and a pien on the other, both of which are made very smooth and without sharp corners. These hammers are made in various sizes. In modeling the leaf it is heated and hammered on the back side with the ball of the hammer, using the elm block to hammer on. The ends of the lobes are then formed to give the whole a decorative effect. These leaves are generally used in grille work and are welded into position. In Figure 5 is shown part of a grille with a similar leaf welded on. In welding leaves to the members of grille work the bottom part of the leaf is formed around the bar; caught with

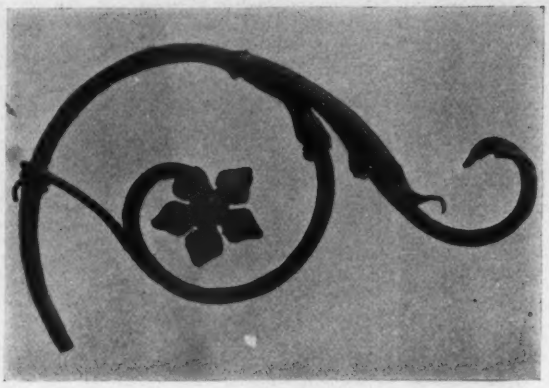


Fig. 5. Grille with Leaf.

a pair of tongs, it is heated, using a flux until hot enough, and then is taken to the anvil and welded. A small collar is then welded in front of the leaf as shown in the illustration.

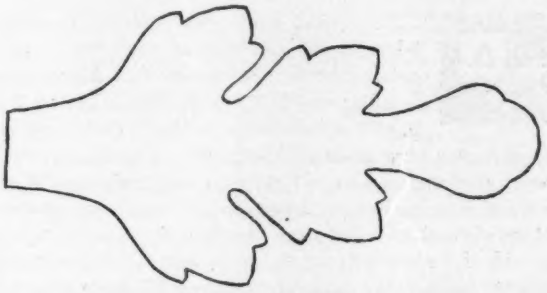


Fig. 6. Pattern of Leaf.

The leaves shown in the illustrations are made to cover the grille on but one side. If a grille is to be seen from both sides when in place, the leaves are cut out symmetrically and then bent and modeled to fit over the top and sides of the bars so that they appear fin-

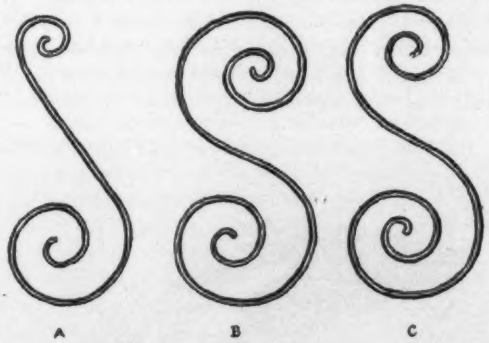


Fig. 7. Volute Scrolls.

ished from both sides. Figure 6 shows the pattern of such a leaf.

The following exercises will be of a simple nature to give the beginner an idea of the tools and processes used in producing this kind of work by hand. The writer does not claim that the following method of working is the only one used in doing this work. There are

many other ways to execute these exercises and one should use his own ingenuity in designing and executing such work. It is hoped that pupils will be encouraged to originate designs of their own that they may work out in this interesting metal.

The tools used in making these exercises will be the ordinary forge shop tools that can be made and will be described later on, as they are needed.

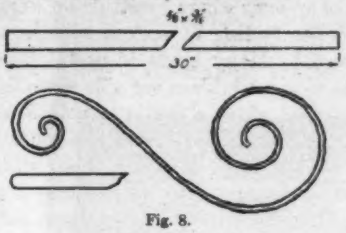


Fig. 8.

Exercise No. 1.

Volute Scroll. This exercise is given in order to familiarize one with the bending of curved forms and also to train the hand and eye in doing freehand work. No metal lends itself more readily to the bending of curves than wrought iron. The scroll is an important element in the designing of iron doors, window grilles,

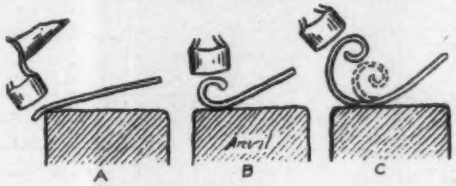


Fig. 9.

etc. In bending the scroll it must not have kinks or flat places, but a gradual curve. If it is desired to suggest strength the scroll is coiled tightly; or if lightness of effect is desired, it is coiled loosely. In making a scroll to fit some particular place a drawing is made with chalk on a surface plate. The scroll is then measured along the line with a string to find its length. In

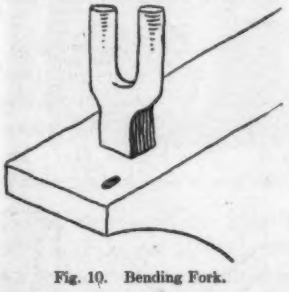


Fig. 10. Bending Fork.

Figure 7 are shown the drawings of scrolls. The one at A shows too much space between the coils. The scroll at B is top-heavy owing to the coils being equal in size. The one at C has a continuous curve with unequal coils which balance better. In bending a scroll from a flat piece of stock, as shown in Figure 8, the end is heated and hammered on the corners to make it round at one end. It is then bent over the outer edge of the anvil, as shown in Figure 9A and B, to form the eye. It is then heated for a considerable part of its length and rolled up as shown at C. If any kinks get into the bar

Fig. 11. Grille.

they can be rectified by hammering on the horn. This is the method used in forming a scroll with the hammer. In heating the bar to be rolled into scroll form, it must not be heated to a white heat. Scrolls are also bent over forms when a great number are wanted. Heavy scrolls are formed by bending them in a bending fork that fits into a square hole in the anvil. (See fork in Figure 10.) A monkey wrench is used to bend the bar when in the fork.

Fig. 12. Grille.

At Figure 11 and Figure 12 are shown grilles which are made from flat stock. The scroll in this case was made after the bars had been welded in place. They could be made first and then riveted or fastened with iron bands, but welding of course makes a better job.

At Figure 13 is shown a drawing for a welded scroll. Notice the dotted line at A. This is where the weld is made. At B, the pieces are shown in position to be welded by the separate heat method. In doing this the length is measured on the drawing with a string, and the three pieces cut. The two short ones are upset; one laid on top of the other; heated and welded at the same time they are scarfed. The long piece is upset and welded to the short one. They are then formed.

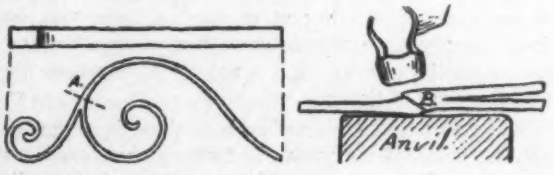


Fig. 13.

MAKING PRIMARY HAND WORK PRACTICAL

Martin F. Gleason, Supervisor of Drawing and Construction, and Edna Keith, Supervisor of Primary Grades, Public Schools, Joliet, Illinois

CHILDREN of primary grades are fond of construction work not only because of the joy they naturally find in the doing of things with their hands but because of the interesting results which their pleasing occupation brings. Every primary child loves and respects the little paper wagon he makes because of its fancied usefulness to himself or his playmates and friends and it is this fancied usefulness that makes his toil in the making worth while to him. The "use" side of the object he is making has everything to do with the amount of interest he puts into his work. Hence, it becomes necessary for us to set before our classes problems for which they themselves see the use; problems which, to the young child, will be sufficient justification for his expended energy and be an incentive to his ambitions.

In very fundamental respects teacher and children differ as to their reasons for the existence of construction work as a part of our school curriculum. The child's view has been given in the previous paragraph. Aside from the use which boxes, envelopes, booklets, etc., will serve in the general work of the school the teacher sees primarily a good, practical, concrete way of motivating work. If she is wise she does not lose sight of the influence which this kind of work may have on her reading, language and geography. She is sure to find much value in the power that construction work correlated properly with other subjects has for fixing facts.

If one expects to gain skill, repetition is necessary and this is as true of construction work as it is of other subjects. A child will repeat a certain problem, such as a box, two or three times willingly and joyfully without losing interest even if he has no direct use for it after it is made. Beyond this point, however, there will be little interest unless the children of a class have in mind some definite use for what they make. Working under this condition many boxes may be made without losing interest, if the use is so plainly apparent that the children will be able to realize and appreciate its value.

A large amount of seat-work material is used in the lower grades, principally in first and second, and the problem of caring for this material and distributing it systematically is no small task for the teacher. The children of these grades can make individual boxes and envelopes to hold almost every form of seat-work material used. This plan not only systematizes the handling of materials but provides practical use for the construction work which young children are able to do.

After the materials are put into the boxes and envelopes the responsibility of caring for them may be placed largely upon the children themselves. Meeting this responsibility even tho it is not great, influences the mental growth of the children.

The purpose of this article is to show, in a general manner, many of the ways in which construction work may serve other subjects and because of this fact details as to the making of the different problems will not be given in full. However, enough will be said to make clear the way in which this correlation is brought about.

In school systems where construction work is taught children get the folding of sixteen squares very early. (See Figure 1.) Many kinds of useful boxes may be made just as soon as children are able to do this folding.

The material which a box is to hold determines its size and shape. At first these matters must be decided by the teacher but after a few have been made the children should be brought into the discussion and led to draw proper conclusions concerning shape and size. The kind of material to be used should be discussed. The question as to whether an envelope will suit the purpose better than a box may come up and be discussed with the children.

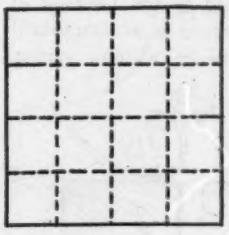


Fig. I

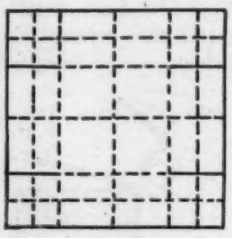


Fig. II

Most boxes in Grade One may be made after the following plan. Use eight-inch squares whenever possible because this is a convenient size for children to handle. Using all of the sixteen squares makes a box four inches square. Cutting away one row of squares leaves a piece of paper which will make a box 2″x4″. By cutting away one row from the top and one from the side we have a 6-inch square which will make a box two inches square.

If the sides of the boxes are made of double thickness they will stand the "wear and tear" that comes from much handling. This double thickness may easily be obtained by folding each of the outside edges to the crease next to it. (See Figure II.) In this drawing the broken lines show where to fold and the heavy lines

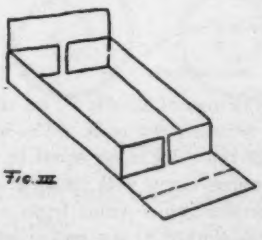


Fig. III

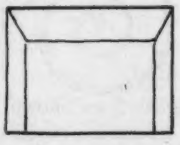


Fig. IV

show where to cut. This changes the depth of the boxes to one inch.

Boxes made in this way may be folded into shape as shown in Figure III. They do not need to be pasted altho pasting adds to the durability of the box.

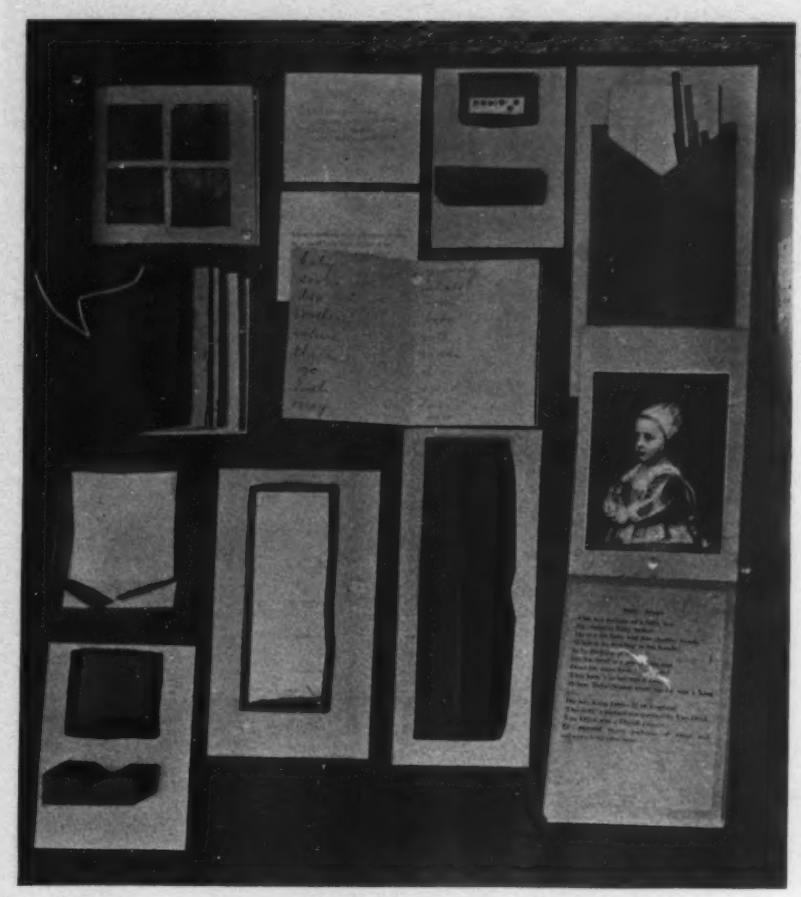
Large oblongs of paper, perhaps 7″x9″, or any other desired dimensions, may be used if a variety of shapes and sizes is needed. The extra width of the end pieces will have to be folded over so that the side pieces and end pieces will be of the same width.

A cover made from the same size of paper as was used for the box may be forced over the box. However, if the paper is to be cut in quantities, it is better to have the piece for the cover one-eighth or one-fourth of an inch larger each way than that used for the box.

While the children are making articles using the folding into squares, the use of the ruler can be gradually introduced. A child has a very great respect for this tool if it can be proven to him that it is of practical use. The ruler, in itself not a very pleasing object, will help a child into a way of making things that are practical, interesting and valuable to his existence, even tho the value in a measure is fancied. For this reason it is essential that construction problems, the making of which involves the use of the ruler, should be made alluring from the standpoint of use and interest and the child will unconsciously become familiar with the ruler.

To become proficient in the use of the ruler much practice is necessary. Very early in the First Grade it may be used as a straight edge and lines drawn parallel to the edge of the paper the width of the ruler from it. The strip thus made will make the flap on an envelope or may be used for the side of a box, etc. Later the inch measurement may be taught.

At the close of a cutting lesson the children of our schools select those cuttings which they consider good enough to keep. After several such lessons they select from all saved those which seem good enough to mount and paste them into a mounting book. This gives the children an opportunity to criticize their own work and in time they begin to recognize what is good.



MATERIALS FOR PRIMARY HANDWORK.

The saving of these cuttings necessitates some way of keeping them safely and each child constructs a "cutting envelope." For the making of this one piece of drawing paper 9″x12″ and two pieces each 3″x5″ are used. With the ruler placed so that one edge coincides with one short edge of the 9″x12″ paper, a line is drawn parallel to the edge and the width of the ruler away from it. The child must be shown how to spread his fingers to hold the ruler firmly while drawing the line. The ruler is then moved so that one edge coincides with the line drawn and a second line is made. The opposite edge of the paper is folded to meet the second line drawn. The space above the second line is folded over for a flap to the envelope. The 3″x5″ strips are folded down the

middle and pasted over the open edges. See Figure IV.

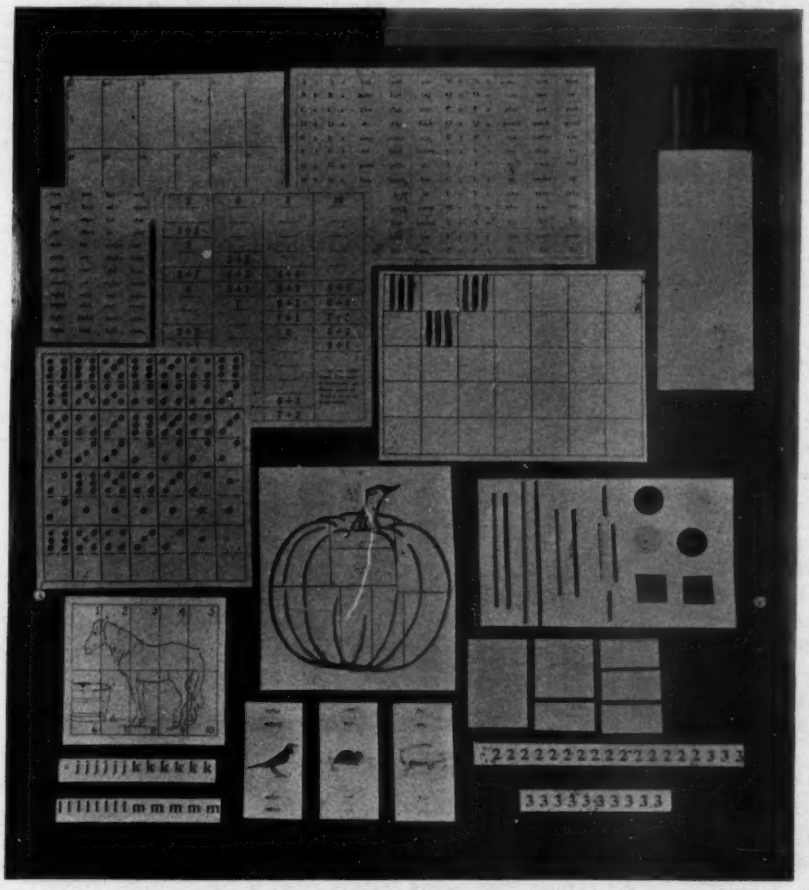
From this very simple way of making an envelope the children grow thru the making of many, as they are needed for holding seat-work material, writing papers, cards for special days, etc., the making of one requiring very careful measurements of any dimension. They also develop an ability to plan the making of an envelope themselves.

During the first term the children of our First Grade make word books. In these the teacher writes the words from day to day as the children learn them. Sometimes pictures are pasted with a printed word beside each one telling what it represents. These books are used for word drill and, later, when the children are learning to write they refer to the books for help in getting the correct form of the words.

The making of the book is very simple. Several sheets of manila drawing paper 6″ by 9″ are folded with the two short edges together and placed one inside the other. A sheet of cover paper of the same size is folded for a cover. The sewing together of these leaves is simple enough for the child to do himself. When sewed, the book is trimmed in the cutter as are all the books made in the First, Second and Third Grades.

The Second Grade word book is made in the same way as the one made by First-Grade children except that the covers are stiffened by having the outside leaves of the filler pasted to the cover. Whenever a book is pasted in this way it is necessary to press it well.

The use of the book in the Second Grade is a little different from its use in the First Grade. The children write their own words, putting in any that they may want to use in a special story or in their nature work. They also put in lists of words showing how things are done (adverbs) and lists of words that describe things. The fact that the words have been written, and repeated reference made to them as needed, often fixes them and in time makes it unnecessary for the child to depend on the book.



MATERIALS FOR PRIMARY HANDWORK.

The Third-Grade classes make a book with the filler of drawing paper but with cover made of jute board. This necessitates the use of art vellum and cover paper for the outside. The outside leaves of the filler are used as lining for the cover. The use of the book is much the same as in the Second Grade, but words from the geography lessons are added.

The book made by the Fourth Grade we call a dictionary book because the pages are indexed and the words are written, each on the page of its initial letter. The use of this book is followed by the use of the dic-

tionary. In the making of this book more difficult steps are added. The filler is made of paper which permits the use of ink. The edges of the pages are ruled and cut to make the index. In making the cover, cloth board with art vellum and cover paper are used. The cover paper is turned over the edges of the cloth board and the corners mitered.

Whenever a decoration adds to the appearance of the book some simple form is used. Paper in pleasing contrast is cut into units and these pasted on, or a unit is used as a pattern to be traced around and the space filled with water color or wax crayon. On some of our books and boxes stick printing has been used effectively. Some of the books are left undecorated because it is thought that the decoration might detract from artistic combinations of materials.

In our Manual Training Print Shop the boys print memory gems on separate slips of paper for our First and Second-Grade classes. When a child can stand erect and repeat in a good clear voice any one of the gems he is given a copy of it for his own. The care of these calls for the making of a book for the purpose. This book is made in the same way as the word book of the First Grade except that its use determines its size and shape and it does not look just like the word book.

In each grade the study of famous pictures has long been an excellent part of our language work and a book is needed in which each child can mount and care for his own pictures. The books are made of a size so that each page gives a suitable margin to the mounted picture.

In the First Grade we use several sheets of 6″x18″ construction or tinted drawing paper. It is sewed as the word book is but with the tie of the thread on the outside. The ends of the thread are covered with a 5″x6″ strip of paper of some color that harmonizes with the cover. This is usually all the decoration needed on this book.

In all of our Art Books the picture after being trimmed is mounted on one page and opposite to it there is a description of the same printed on the Manual Training Press.

As the pictures are all of the same size there need be no difference in the size of the books made to hold them in the different grades. The Second-Grade book cover is stiffened by the use of manila board put together with art vellum and covered with cover paper. The Third Grade uses jute board for the cover. The Fourth Grade uses cloth board, binders' cloth, and cover paper and as in the making of the dictionary book, the edges of the cover paper are turned over the edges of the stiffening and the corners mitered.

Another line of work that finds a place in each grade is the making of number games. The Second Grade makes two-inch cubes, pasting figures cut from large calendars on each face. Two children throw their cubes on the floor at the same time and the one giving the sum of the two figures on top, the difference or whatever is agreed upon beforehand, makes a score. The children find other ways of playing the game. See Figure V.

The Fourth-Grade children make a game which is a very great help in fixing the multiplication table. A twelve-inch square of manila board is ruled off into one-inch squares. The squares in the upper and in the left row are numbered from one to twelve consecutively and the remaining squares left blank. A nine-inch square is ruled off into squares each three-quarters of an inch wide. The products in the multiplication table are

Fig V.

written in order in these squares and the whole cut up into the 144 small squares. The object of the game is to place each of the small squares into its proper place on the twelve-inch square. Each child keeps his own record of the time taken to lay all the table in proper place and endeavors in succeeding trials to beat his own record. See Figure VI.

The twelve-inch square is folded and an envelope 6¼″x12¼″ made to hold the game when not in use.

Occasionally we have heard criticisms about the length of time taken for construction work. At one time

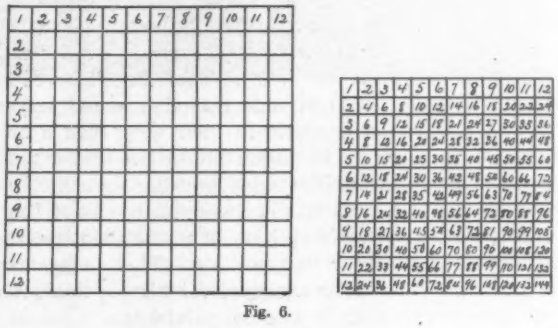


Fig. 6.

a mother was heard to say: "Miss A has actually spent three days making valentines. They give altogether too much time to construction work." Miss A had spent some of each of three days making a valentine. She began in a language period when she told the story of St. Valentine, letting the children recall what they could of the valentines they had seen and had led the children to feel that they wanted to make valentines. An arithmetic lesson was used in planning, in measuring the paper and in cutting out all the parts to be used in the valentine. A drawing period was just long enough for the coloring that was put on. A second arithmetic period was spent in pasting the parts together and in making the envelope. A second language period was used in deciding upon a verse to be used, in copying it and in putting the address on the envelope. A third language period was used by the children in telling how they made the valentine. Could there be better arithmetic or better language work than was given during those two

or three days when each lesson was made alive with the opportunity given the children to satisfy the desires that were so real to them at that time?

It will be seen that with the making of boxes and envelopes to hold individual portions of seat-work material, the making of books for different uses, the making of room decorations for the special occasions thru the year, of valentines, badges, etc., for holidays and of gifts for mothers at Christmas time, there need be no lack of problems for which the child can see the need. When he sees the need for the various problems construction work becomes a source of infinite delight to himself and to his teacher, and the first great requirement of this sort of work is accomplished.

PRINTING IN THE SALINA HIGH SCHOOL

Karl H. Miller

PRINTING, as a part of a grammar or high-school curriculum, is nothing new. The work, however, is in its infancy. Great things have already been accomplished, but because of its unlimited possibilities printing, as a public school subject, must pass thru many stages of development before we may even hope for it to attain its fullest possible results.

Printing is a most valuable subject in the Industrial Arts Department of the Public Schools, large or small, and especially for the vocational or Trade School. This is one course that actually pays for itself. A school printshop should turn out all report cards, filing cards, information cards, invitations, school announcements, courses of study, letter-heads, posters, tickets, bills, mottoes, children's health codes, etc.

The work may be done exactly as it is in a commercial shop. It is not necessary, however, for the pupil to serve his time as "devil," running errands and doing odd jobs for a year or more before he is allowed to learn the case. Printers state that they would rather have a high-school graduate in their shop than a boy without schooling. The reason for this is that a good printer must be familiar with sentence construction, spelling and punctuation. The more knowledge of English the applicant for a position in a printshop has, the better fitted he is for that position. This young man will certainly be better equipped for his position after he has spent his time in a school printshop.

Printing is the foundation of a large number of trades—the backbone of every business. It would be difficult to find a business house which can prosper during the present age without advertising its goods. The knowledge of type faces and sizes with the amount of display work handled in the school printshop will be of importance to a boy or girl in any business. Printing demands originality.

But the idea of teaching a trade should not be emphasized in public-school printshops. The educational side, with the development of originality and art must be the aim of a successful high-school shop. The instructor should endeavor to create an appreciation for well arranged pages, beautiful coloring and a desire for first-class printing. We try to have our ideals high at Salina, but comparing our products with the accomplishments of professional printers, we readily see that we are falling short of the possibilities of our equipment.

Printing not only teaches the pupil to work accurately, but also calls for the practical use of spelling, punctuation, division of words, paragraphing, sentence construction, etc. The dictionary is in constant use. Printing may be correlated closely with the English department. Pupils failing in English may be required to set rules, etc., in type and print copies for all the school. The Salina High-school Printshop is at present furnishing the English classes two pages of supplementary material each week.

Journalism is being added to the English courses in a large number of high schools. Salina has such a course. The pupil takes added interest in his reporting if he feels that there is a possibility of his story appearing in print. The copy for a column in each of our daily newspapers is furnished three times a week by the class in Journalism. This arrangement is helpful, as every misplaced clause or comma, every poorly constructed sentence, stands out plainly when read from a printed page. The disadvantage of a column in the newspapers is that each item is generally—I might say is always—but one paragraph in length with no individual heading.

Journalism may be successfully correlated with work in a high-school printshop, I think, to more advantage to the Journalism class than to the printing class. The sheet "Now and Then" is the product of the correlation of the subjects in the Salina High School. A small news sheet will develop the essentials of a newspaper article. The short column makes it necessary that the heading and the first paragraph note all the main items of the news story. The remaining space will generally accommodate two or more paragraphs, but the story must be written so that one or more paragraphs may be "pulled" without destroying the effect of the article.

The objection to such a sheet from the printing department is that a beginning pupil should not attempt the setting of straight matter in the short length line. The more advanced student will gain more by arranging mottoes, poems, ads, etc., in colors. However, the publishing of a small news sheet at intervals is a success and offers the greatest benefit to the largest number of persons.

Printers are always well read men. "I believe Mark Twain, like Franklin, learned more in the printing shop than the average boy at college. He graduated from the printing shop high school and then spent four years

SAMPLES OF PRINTING PRODUCED IN THE SALINA HIGH SCHOOL.

in the pilot house. These four years were his University Course."

Quoting from L. W. Wahlstrom, "Printing is distinctly a social art. Setting type and striking off of a number of impressions presuppose, in the first place, a community to read what is printed; and in the second place, that the information printed is of value to this community." The striking off of many copies does not suggest selfishness. The student receives no reward other than praise for a job well done.

In cutting the stock for our school paper we have a certain amount of waste. We use this small stock for booklets and mottoes. Good-natured rivalry is developed in requiring each member of the class to select and arrange a motto or poem for a booklet. The student comes in contact with the best in literature in his search for a motto which he thinks will be suitable. This exercise arouses a desire to be able to quote all sayings printed. The boys enjoy having a new one "to spring" on their classmates each day. The arranging of the mottoes as to type, order, stock and ink requires the use of mathematics and the study of the harmony of colors. This type of work appeals to all of the class, develops originality and incites a desire for things beautiful.

The addition of printing to the Manual Arts Department of the Salina High School in 1911 was rather unique and somewhat of an experiment. The School Board, not realizing the wonderful possibilities of the work did not desire to expend money for the subject. The students, thru the efforts of John Lofty, then superintendent of the Salina city schools, now of Manhattan, Kansas, borrowed money, at eight per cent, from different school treasuries to purchase a $600 equipment. For three years, during which time the department paid its debt, paid the interest and added from a hundred to a hundred and fifty dollars' worth of equipment each year, printing met all of its running expenses. In addition, we were the official printers for the School Board, turning out all report cards, circulars, etc. The Board furnished the stock for their jobs. Our greatest revenue for obtaining money to meet our obligations was "The Habit," our school paper. Had we taken the outside job printing offered us we could have purchased more equipment.

This past May the board took the department over and purchased a Six Hundred Dollar press to supplement the one already installed. This was not done as a charity act, for the board owed the department more than that amount.

"The Habit" is now published entirely separate from the school printing. We have a business manager, receiving regular school credits for his work. He does

all the buying of stock needed for the publication of "The Habit." We are able to publish a forty-page monthly paper, including a 117-page annual for $0.35 per year.

In publishing a school paper, editors, business managers, illustrators, cartoonists, artists, designers, reporters, advertising managers, compositors, proof readers, foremen, and pressmen are developed.

The business manager of the shop has charge of the stock room, handling all invoices. The shop manager checks all job work by the use of a practical cost sheet. This necessitates the keeping of time cards for all job work. Mathematics is put into practical use in the finding of the number of cards that may be cut from a sheet of a certain size. In tabular work, in the arranging of pages, the point system brings mathematics into full play.

Each pupil in our shop has a definite position assigned to him, being shifted at intervals so that he may be given a part in all the steps of the work. A student showing special ability and a desire for a certain part of the work is allowed to specialize in that work.

We are carrying on a campaign to inform the public of school happenings and of its benefits by the use of blotters which are arranged and printed by the students.

To my knowledge, at the present time only three city schools in the entire State of Kansas have a printing course. A fourth is installing equipment for the work. Bookbinding may be combined with printing at a very small expense. A $600 equipment combined with bookbinding will accommodate a class of 20 pupils. We find schools installing a woodworking course or continually adding to one, entirely ignoring printing as a manual arts subject.

Remember that a printing department pays for itself. Yes, money is a vulgar subject, but stop and think. Suppose you are offered a position in the school system of a certain city, what are your two first thoughts? They are undoubtedly: What is the salary? What are the living expenses? At times we must talk in dollars and cents. The school board must at all times consider the expense of the course to be introduced and will be pleased to find one subject or course that will be self-sustaining. Invest a sum of money equal to one-half of your last year's printing bill in a printing equipment for your school. You will be so well repaid that you will wonder "Why did I wait so long to install a course in our school which in addition to having unlimited possibilities for the education of the pupil, more than pays for itself?"

CO-OPERATING WITH THE MOTHERS

Grace Viall Gray

THERE are many ways in which a teacher of Home Economics can bring the mother and daughter closely together. In fact, there is no other teacher who has such vast opportunity to bring the home and school into close co-operation as the one who teaches girls the rudiments and principles underlying the work in the home.

A teacher of history, mathematics and literature is at sea when it comes to entering the home life of the school girls. There is no common ground on which teacher, mother and daughter step.

One of the first duties of a Home Economics teacher is to make every mother in the community feel that she is in sympathy with the mother's problems in the home. The writer has found that, as a rule, women are very much afraid of the Domestic Science teacher. They have a very wrong idea that she knows everything about the intricacies of the running of the home and consequently is very critical of their establishments. It is such a mistaken idea. But the young teachers just starting out in their profession will find this sentiment everywhere. Older ones in the practice will agree to this. It may take a long time to really convince the mothers of your community that you are not critical and that you are more than glad to be entertained in their homes. A mother, at least the right kind of a mother, likes to know her children's teachers and to write them to share her hospitality. She may invite all the other teachers very readily but when she gets to the Domestic Science teacher she balks. She fears the food will not be just right to suit this wise teacher; she doesn't know whether she will serve the things just as they should be served according to rule and regulation and fearing criticism she does not invite the teacher at all. Probably this very teacher is hungry to get into a home; to taste some one else's cookery; and to know her pupils' mothers.

If this mother can only be convinced that the very fact that a teacher is a Domestic Science teacher she has all the more sympathy, understanding and appreciation; she knows from actual experience how hard it is to get a dinner on the table with the hot things hot and the cold things cold. The Domestic Science teacher is far more apt to be less critical than any other teacher, if only the mother knew it. The more one knows about a thing, the less critical and the more appreciative she is.

However, until we can convince all mothers of this fact, Domestic Science teachers will have to fight strenuously against this prevailing sentiment before she can win a mother's approval or co-operation.

One of the best ways to counteract this feeling is to:—

1. Always make the women welcome in your cooking laboratory. Invite them to drop in any time and it will not be long before they will make the very natural discovery that things proceed in your laboratory the same as they do in their own kitchens. Spoons will be dropped, the girls will forget the salt or sugar, the cake will be too coarse, the tomato soup will curdle, etc., etc.

Immediately you will be on common ground. The mothers will consider you as human after all.

2. Give demonstrations once a week or once a month according to circumstances. You will find the women respond very eagerly. All women like to attend demonstrations. In the demonstrations, it can be clearly emphasized that you are merely teaching them the "why" and "wherefores" of things, such as why they put cream of tartar in Angel Food Cake; why they add salt to the egg white before beating it, etc. They will see that you are not attempting to make a better cake than any woman in the audience can make. Practice makes perfect and they, as housekeepers, get three or four times as much practice as you do.

Let the women ask questions freely and be very frank to say you don't know if you really don't. You will be all the closer to them if you are found wanting in some form of knowledge.

3. To really win the mothers' hearts and show them what their girls are really doing, give frequent luncheons. The luncheons can be very inexpensive. The girls can make menu cards, giving the price of the different foods. This will immediately start conversation and this will be your opportunity to show the mothers how you are also fighting their problems of the high cost of living. You will become one of them instantly.

4. Have a Home Economics Club for the Women of the Community. Papers can be prepared and discussions can follow. Talk over the girls' problems, find out what the mothers would like introduced into the curriculum, make them feel that you have their daughters' interests at heart as much as they. Make them understand that you are trying to give the girls a keener interest in the home; a better appreciation of home life and individual efficiency. The girl who learns by actual experience to bake a loaf of bread, to prepare an appetizing, wholesome dish for the table, to make a glass of jelly, to make an apron for herself or her mother; to neatly mend a stocking—if she performs these important duties well, combining with her work, cheerfulness, thought and study—is being educated.

If a mother once sees this, she and her daughter will be happier in their home life for your co-operation with the mother. There will be no pushing the girl out of the kitchen because she is more trouble than help; there will be no selfishness on the mother's part because she doesn't want Katie and Mary to have to work in the kitchen as she does; she will not sit up late at night darning stockings for the whole family, etc. Both mother and daughter will see that these duties are educative, interesting and worth while and not drudgery and are more pleasurable when shared.

5. Co-operate with the mothers in having girls practice at home. Give credit for work done at home. After a girl has had a cooking or sewing lesson she should be allowed the privilege and right to put into practice what she has learned. This cannot be done unless the mothers will co-operate with the teachers. If she be given school credit for home work it naturally follows that home and school will be brought into closer relation. The result will be beneficial to mother, daughter and teacher.

In the May number of the INDUSTRIAL-ARTS MAGAZINE, a system of "School Credit for Home Work in Home Economics" which is used in the schools of Ames, Ia., is described. To show how closely mother and daughter must work in order for the girl to gain credit, I quote this small portion of the schedule:

"The total for general housework is 2-3 credit, 200 points; work carried on for eight months received 1-3 credit, 100 points; work carried on for sixteen months received 2-3 credit, 200 points. The general work consists of the following:

1. Making girl's own bed each day, 3 points for four weeks.

2. Daily and weekly care of one bedroom, preferably girl's own room, 4½ points for four weeks.

3. Helping with general housework one-half hour each day (sweeping, dusting, ironing, washing dishes, washing windows, etc.), 3 points for four weeks.

4. Helping with general housework one hour on Saturdays, 2 points for four weeks.

The total credits for general work are 12½ points for one month. One task must be done for four weeks in order to get any credit."

In the same number of the magazine there is an account of the Credit for Home Work at St. Cloud, Minnesota. The system of giving this credit must have the mother's co-operation to be successful as one can readily see.

But its so worth while its worth striving for. The girl will carry some new ideas into the home. The mother and daughter in discussing and performing the home duties together are forming a bond or tie that will bind their lives close together because of mutual interests, duties and pleasures.

There is no reason why a girl should not receive credit for work done in the summer months under her mother's direction.

6. Have an exhibition day before school closes every year or any time during the year for that matter. It could be called Patrons' Day, Agricultural Day, or Home Economics Day. Entry cards can be placed on the articles of sewing or cooking to be displayed bearing the names of the makers. The mothers, relatives and friends will flock to see the handiwork of the girls.

In conclusion it can be said that the states with the highest educational facilities are those where the women are most active. Women have been largely responsible in bringing about the establishment of industrial training. Parents must be made familiar with the school system, its needs and organization before they will give their support. It rests with the teacher whether or not she has the co-operation of the home and the mother in the lives of the girls.

ELEMENTARY MECHANISMS

Ray F. Kuns, Cincinnati, O.

(Third Article)

Steam Engines.

ONE hundred per cent of the boys between the ages of 10 and 16 years are interested in steam engines. Not in every case, however, is the interest sufficient to prompt the labor involved in the building of one. Once the boys understand that it is just as simple a matter to build a steam engine as it is to build a tabouret, experience seems to suggest that from 50 to 95 per cent of the boys of any one class, will sooner or later select it as a model to build, even tho this means the paying for materials which might otherwise be furnished free of charge. This last fact is significant, as indicative of a boy's natural interests. Boys in the Oyler school have paid anywhere from ten cents to one dollar for materials for engines, while materials for wood models were furnished to all who desired them without charge.

Three, of a number of models of engines, will be shown. The "One-Way Horizontal" built by anyone in the sixth or above; the Two-Cylinder Upright, built by anyone in the seventh or eighth; and the ¼ H. P. Horizontal, built only in the eighth grade. Until the metal-working sentiment has been cultivated, the smaller models are best regardless of grade.

The One-Way Horizontal requires from 20 to 35 hours of sixth grade time.

The Two-Cylinder Upright requires from 30 to 60 hours of seventh grade time.

The ¼ H. P. Horizontal requires from 100 to 150 hours of eighth grade time.

While these models are the most popular ones, and are turned out in numbers, new ones are constantly being worked up. Any boy with a practical idea of his own is helped in developing and applying it.

Seamless drawn brass tubing is used in every case for the cylinders and steam chests, unless old bicycle pumps are available. Sheet metal may be copper, brass or iron. Brass is easiest soldered and worked, as well as best appearing. White metal for the castings may be lead, babbitt, solder, zinc, or block tin. Lead may often be secured by the boys, while a cheap grade of babbitt costing about six cents per pound is the most satisfactory, as it gives a smoother casting and is easier to work.

Whatever model is built, the steam chest and slide-valve are deserving of greatest care. On their proper functioning depends in a large measure, the success of the engine.

Simplicity of design is the keynote of success, with the boy doing the work.

One-Way Horizontal Steam Engine.

Care in working up this engine will be rewarded with a neat, speedy and attractive model. It is hardly large enough to be rated by horse power. Theoretically, however, it ought to develop between 1-16 and 1-8 H. P. Being a one-way engine necessitates heavier fly wheels than otherwise. In this case they serve to make the engine run more steadily, and aid in developing greater power.

A section of the engine with base underneath is shown. It will pay to make a careful study of the drawing learning the names and relation of the various parts. With a thoro knowledge of what is required of each part the work is made easy.

Base. Get this cut to size using any sound wood. Next get out the block which fastens onto the base forming the cylinder rest. This is held in position with two 1½″ screws run in from the under side of the base.

Bearing Support. The bearings are simply 3-16″ holes drilled in the shaft support. Work this out to the size shown using strap iron or brass. Be very certain to get the bearings equidistant from the base.

Crank Shaft. This is made from a piece of 3-16″ brass or iron wire. Cut to length with the hack saw and lay off points for bending, using the three-cornered file to mark them lightly. In order to bend the shaft without marring it too much, take a piece of ¼″ iron several inches long, and file a V shaped groove or notch in it across one edge. This should be large enough to allow the shaft to come a little more than half way into it. In bending the shaft first clamp this iron between the two center marks on the shaft, holding together in the vise and bending the center angles. Move iron to other marks, and bend the shaft to the required angles there. After the shaft has been bent up in the vise, take to the anvil or other true surface, and carefully true up, being sure the ends line perfectly with each other.

Connecting Rod. Work this up to the size and shape shown, using either brass or iron.

Eccentric Rod. This is made from either brass or iron wire. Carefully flatten one end, and drill a ⅛″ hole in it. Bend the other end as shown in the drawing.

Rocker Arm. This is made from either sixteen or eighteen gauge sheet metal. The holes are all ⅛″ and have their centers located 3-16″ from the edges.

Cylinder Fastenings. These are made from sheet metal. The front one is bent at right angles on the dotted line, thus forming the rocker arm support. A ⅛″ hole is drilled in this part later on when assembling the engine. Holes for fastening to the wood cylinder rest may be drilled at this time.

Cylinder. A piece of 1″ brass tubing 3″ long has each end squared up with the file. Cut tubing with the hack saw when first getting out. In order to saw tubing without breaking the teeth out of the saw, it is necessary to always saw on top of the piece being cut. This means turning the tube in the vise every few strokes of the saw. Two blocks of soft wood with V-shaped notches cut in them are used to hold the tubing when clamping in the vise as this prevents its being crushed. Even with this arrangement judgment must be used in tightening up on the vise.

ONE-WAY HORIZONTAL STEAM ENGINES.

Next cut a sheet metal disk 1″ in diameter, and solder on to one end of the cylinder for a head. Drill a 3-16″ hole in the center of this. With a fine half-round file or sloyd knife remove the burr made by filing the open end of the cylinder.

Steam Chest. This requires a piece of ⅜″ brass tubing 2″ long. After cutting to length and squaring up, drill a 3-16″ hole in this ¾″ from one end. Remove all burrs from the inside of this with the file or knife avoiding scratching as much as possible. Place a wood plug thru the hole in the cylinder head from the inside. Set the steam chest on this plug, so the two holes come together, and solder it fast. The wood plug keeps the port open.

Piston. First cut the two sheet-metal discs just to fit the inside of the cylinder. Drill a ⅛″ hole in the center of each. Dowell rod serves splendidly for the wood core which has a ⅛″ hole drilled thru its center. Next get out the end clip using 16 gauge sheet metal, Bolt all of these parts together after which the clip may be bent to shape, so as to form the connection for the connecting rod.

Slide Valve. Bore a 5-16″ hole in a wood block to the depth of ¼″. Take a piece of ⅛″ brass or iron wire 2½″ long, and set in the center of the hole. After treating with soldering salts and tinning the end of the wire, the hole may be run full of melted solder, working it with the soldering iron. Remove from the wood when cool, and work to shape shown in drawing, being careful to get the groove cut to the same depth all of the way around the slide, else it will be hard to pack later on. Next file the slide to a snug fit in the steam chest.

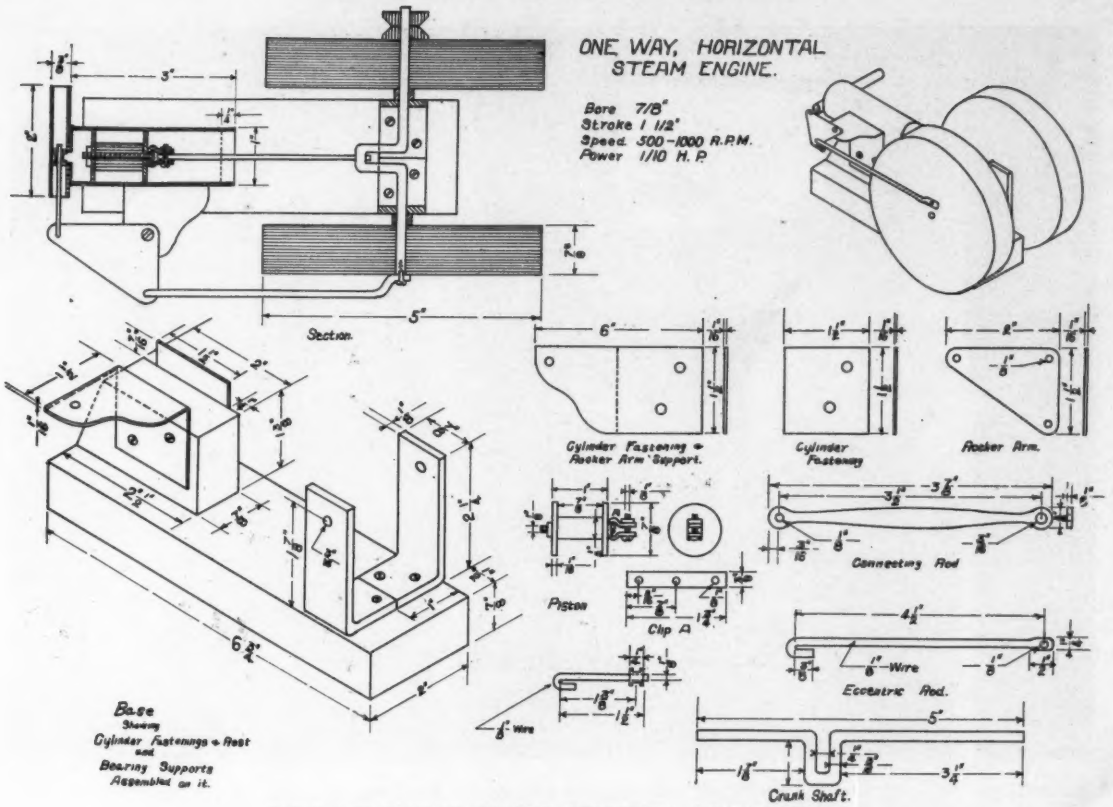
Wheels. These may be worked out by hand, or turned on the lathe if one is available. In this case the sides of the wheels may be hollowed out to give the engine a better finished appearance.

Pulley. If no small pulleys are at hand, one may be made from the two ends of a spool held together on the shaft by means of a tin bushing.

Assembling. Place on cylinder fastenings, using screws to hold it in position. Place cylinder in position on support between fastenings. Carefully solder in place, being sure the steam chest lies horizontal, and that the front end of the cylinder laps over the front end of the support just ¼″. Place connecting rod on the crank shaft; this may require the use of the countersink on each side of the hole in the connecting rod to allow of its being passed around the angles in the shaft, which in turn may need to be filed a little. Next place crank shaft in bearings, and fasten the supports in place. Place piston in cylinder, and fasten connecting rod to it, using ⅛″x½″ R. H. stove bolts.

Slip a washer, which may be made from the brass nuts off the binding posts of an old dry battery, over each end of the shaft. Slip on wheels, being sure to have a tight fit. The shaft may be filed square, and forced into a ⅛″ hole bored in the wheel. While this means more work, it is worth the extra effort. The pulley wheel may now be placed in position and secured.

Place in the slide valve. Connect the eccentric rod to the wheel with a small round head screw, placing it



PARTS AND PLAN OF ONE-WAY HORIZONTAL STEAM ENGINE.

just 5-16" from the center of the shaft and directly above it, when it stands as shown in the sectional view. This gives the eccentric the necessary ¼ revolution lead over the piston.

Next assemble eccentric rod, and slide valve in position on the rocker arm. When the position of these is as shown in the section, the hole in the rocker arm support may be located and drilled. Use one of the small stove bolts to fasten rocker arm in position, placing two nuts on it to prevent the motion of parts loosening it.

Once it is certain that all parts are in correct relation the piston and slide valve may be removed, and carefully packed. Use soft yarn or waste for this, watching to see that all sides fill out evenly. Do not pack or wrap these too tightly. A springy, spongy packing is much to be preferred to the solidly wrapped one. Use plenty of thick oil. Having the engine complete, it may now be tested on the boiler. Failure to operate may be due to a number of causes, but the trouble will usually be found in the steam chest. Either the valve is not properly packed, or what is most often the case, the valve is not correctly timed. All of these minor troubles can usually be located quickly, and easily repaired, tho at times they furnish material for study on the part of all concerned.

Black paint or enamel should be placed on the base, support and wheels. The wheels may later be trimmed with gold or aluminum bronze, and the engine otherwise decorated and polished.

A throttle may be a small valve placed in the rubber tube used to connect the engine to the boiler or soldered to the intake.

Soldering.

There is nothing particularly difficult about soldering, yet there are essential points which must be observed.

Soldering Salts. Some sort of flux is necessary for all soldering. Acids, pastes and salts are commonly used. The latter is perhaps the best for school work, as the same mixture will usually do for all classes of work. Having prepared these according to directions by mixing with water, a small quantity may be poured in an old cup or tumbler, for dipping the heated iron in, as it comes from the fire. This is very important, as it means a clean iron at all times.

Heating. The irons may be heated by means of the gas stove, gasoline blow torch, charcoal furnace, or the ordinary coal or wood fire. A clean blaze is much to be preferred to coals as a dirty, smoky fire. *Do not* heat the irons to a red heat, as this will burn off the tin.

Tinning. This is one of the most essential processes of all soldering. New irons must first be tinned, and old irons require frequent tinning. Many methods and materials are in common use. One of the simplest is given.

File the point of the iron bright and clean. Heat and dip into a vessel containing some soldering salts. Lay a piece of clear tin on the table and melt a little solder on it with the soldering iron. Work all sides of

the point of the iron in the melted solder, until they become thoroly coated with it. It may be necessary to dip the iron into the salts occasionally while working it, in order that all points on the point of the iron become coated. Overheating the iron means burning off the tin, while underheating means crude work.

Soldering. A few simple rules vital to good solder work are noted:

1. Have work clean, and free from grease.
2. Treat only parts to be soldered with salts.
3. Allow solder to lie on the table, and carry it to the point desired on the tip of the soldering iron.
4. Always work with the tip of the iron.
5. Have close-fitting joints before attempting work.
6. See that the solder runs on the joints, and does not lie in lumps.

Boilers.

A new one-gallon kerosene oil can makes a good boiler for the kind of steam engines being described. The cap serves as a place for filling, while the spout serves as the outlet for the steam. Never fill the can more than two-thirds full, and never allow more than one-half of this to get out before refilling. Connect the engine to the boiler by means of a rubber tube. If the tube is not forced on too tight, it will serve as a safety valve, tho a better plan is to arrange some simple device on the top of the can for this purpose.

Range boilers or hot water tanks can often be converted into low pressure boilers, while the ingenious workman can arrange boilers of different styles with safety valves, water gauges, etc. It must be remembered that once the pressure goes over 15 pounds, it is getting dangerous, unless the boiler is strong and fitted with regular steam fittings.

A pressure of two pounds will operate any of the models shown, while in no case should the pressure exceed 50 pounds.

The power rating of all models is on a basis of 33 pounds pressure to the square inch, no deductions made for friction or other causes of inefficiency.

BOOKBINDING

Nancy Beyer

THE majority of library binderies employ a few skilled tradesmen from foreign countries, brought over to fill positions for which we do not have trained workmen. The other employees receive their training by experience in the bindery. This training is limited to a few steps, in one of which they become efficient, so that the skilled tradesman has the advantage.

Illustration No. 1 shows a class of high-school girls working at bookbinding in the department of library training of a New York City High School.

A library bindery differs from a commercial bindery in having a fixed method of sewing certain books used in circulation. A method of sewing is used that will outwear the original cover several times.

Illustration No. 2 is the sewing room of a library bindery where all books of fiction as they come from the commercial bindery are resewn and rebound by the perforated method before being placed on the shelves for circulation.

The books are trimmed so that all leaves are single sheets and as many leaves as are usually found in a section are perforated at one time by the perforating machine. The sewing is done by hand. Illustration No. 3 shows the stitch used in sewing the books.

Other books, non-fiction, are sewn on sunken cords as shown in Illustration No. 2 where sewing frames are used. Any hand work such as the making of a portfolio is done in the sewing room.

In illustration No. 2 is seen thru the open door the forwarding room. Illustration No. 4 is a view of the forwarding room where the forwarding and finishing

Fig. 2. Sewing Room of Library Bindery.

Fig. 4. Forwarding and Finishing Room.

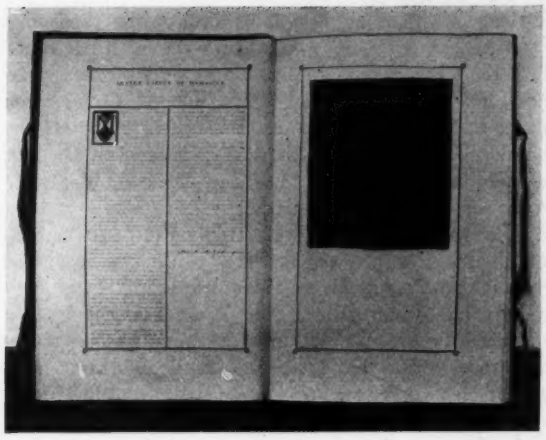


Fig. 5.

are done from which all books go to their places on the shelves well equipped for "traveling."

The question is asked: Why do not the commercial binderies send out books of fiction with the perforated method which is so strong? There are several answers to the question. The commercial binderies can give the best answer. They meet the demand of the general public for a good book at a small price.

Public libraries very often have interesting collections of rare and beautiful books not in circulation. Illustration No. 5 shows such a book from "The Yerkes' Collection of Oriental Carpets." The book is bound in

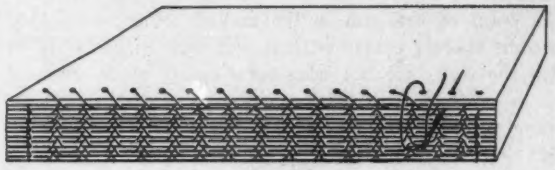


Fig. 3. Sewing.

green silk pongee, a material commonly used for portfolio binding. The binding has three parts which characterize a portfolio, the covering, the tapes, and the lining. The outside case cover is made as a portfolio, without flaps, and has ribbon tapes on the fore edge and at the head and tail. These are not shown in the illustration. The book which is inserted into the cover, adheres to the back, and is lined with a yellow silk pongee.

Illustration No. 6 is of portfolios lined with wood-block printed papers. The outside covers are of natural colored linens. Some of the linings are of anti-rust paper and some of an imported paper in soft tan shades.

The wood-block printing was done in dull blues and green used together, browns and reds, and some in blacks and two colors.

The imported papers are artistic as they are hand-made and very often block printed by hand. Illustration No. 7 is a portfolio made of imported papers. It has a paper cover of gray and is lined with a Japanese shadow paper wood block printed showing gray leaves on a cream ground.

The following table of measurements for Illustration No. 7 will give an idea of the materials required:

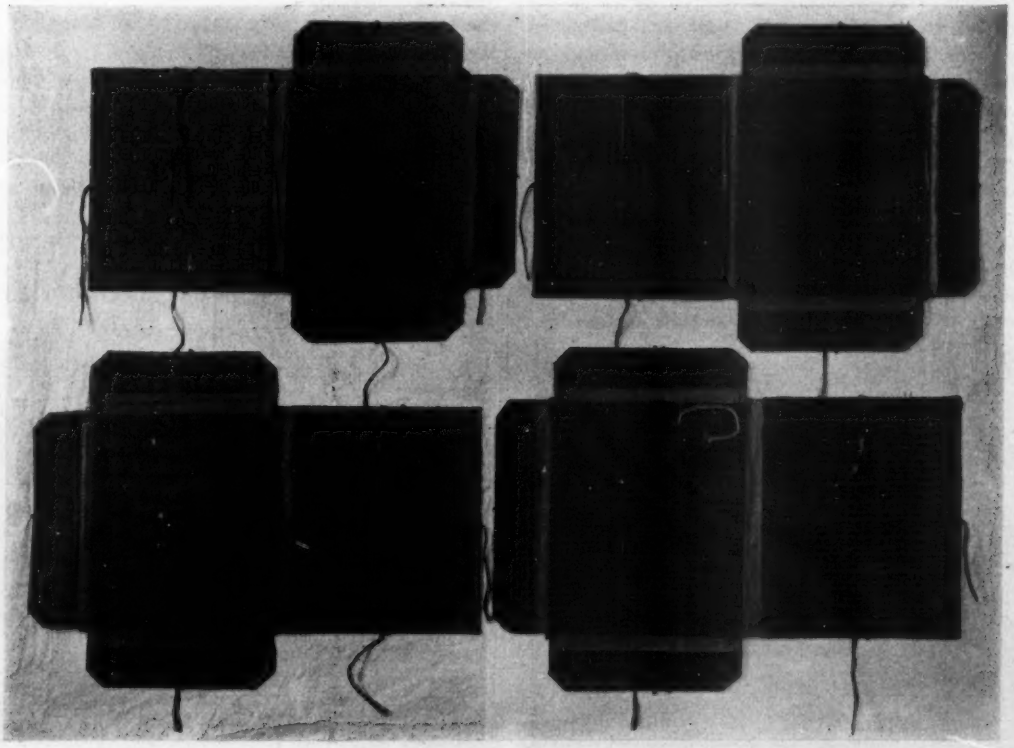


Fig. 6. PORTFOLIO.

Fig. 1. BINDERY IN NEW YORK HIGH SCHOOL.

Covers.—Binders' Board.
2 pieces—17½ in. x 13½ in.
Flaps.—Blue Tint Board.
1 piece—17¼ in. x 3 in.
2 pieces—13¼ in. x 3 in.
Gray Cover Paper.
2 pieces—18½ in. x 14½ in.
1 piece—18¼ in. x 5¾ in.
2 pieces—14¼ in. x 5¾ in.
Hinge for Back.—Gray Cover Paper.
1 piece—18¼ in. x 3 in.
1 piece—17 in. x 3 in.
Lining Pieces.—Shadow Paper.
2 pieces—17¼ in. x 13¼ in.
1 piece—17 in. x 2¾ in.
2 pieces—13 in. x 2¾ in.
Tapes.
6 pieces—6 in. each.

The following directions for making will be helpful:

The first pasting to be done is to "line up" the large boards. This means to paste white print paper, the size of the large boards, to the inside of both boards to keep them from curling outward. The paste is put on the board. The board is placed to the print paper, protected by another piece of paper. It is smoothed with a roller or folder, and the extra paper is trimmed away from the edges.

Then, the large boards are covered with gray cover paper, and the edges and corners are turned. The flaps are covered in the same way. In the table of measurements the diagonal cutting of the corners of the blue tint boards are not given as they can be of any shape or size. The hinges on the flaps and the hinge for the two boards are lined with gray cover paper. Tapes are inserted by using a chisel to drive slots from the outside thru the boards. Insert the tape about one-half inch; close the slots which hold the tapes by using a

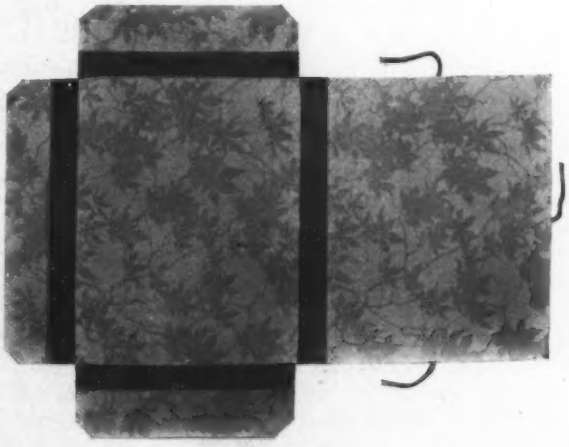


Fig. 7. Portfolio.

hammer on the inside of the slots; glue the tapes to the inside of the boards.

Hinge the two large board covers together as shown in illustration No. 7 by pasting the hinge one-half inch over the inside of both boards. Paste the flaps in the same way and dry before lining. Paste in the lining, putting the paste on the lining paper. A good maxim in any binding is to "put the paste on the smaller piece."

The technique of good paste work is in the constant use of white print paper to protect while smoothing or pasting.

NOTE—Illustrations Nos. 2 and 4 are reproduced by permission of The Carnegie Institute Library Bindery of Pittsburgh; illustration No. 6 by permission of The Art School of The Portland Art Association.

THE BLUEPRINTING PROCESS

L. C. Dewey

ABOUT the middle of the nineteenth century, an unknown German chemist discovered a formula for sensitizing paper to make it susceptible to rays of sunlight, and applied this paper to the making of blueprints from drawings in ink on thin paper. It is believed that the prints first made were developed and fixed in acid baths similar to present photographic methods. Before long, however, a solution was found which would hold a deep blue color, after being exposed to the sunlight, when washed merely in clear water. This solution has been in use for over fifty years by all makers of blueprint papers, in Germany and Switzerland. It was first seen in this country at a Swiss exhibit at the Centennial Exposition in Philadelphia, in 1876. Eminent engineers of that time declared the process unworthy of adoption, and that it would never become universal or meet with favor, on account of the change from black lines on a light background to white lines on a dark background, which they said would confuse the workmen. They disliked it also because the operations were too sloppy for the drafting room or office. It has, of course, since been proven that they were altogether wrong, for now the blueprinting process is common in all lines of technical work all over the world. The workmen are accustomed to the white lines, and say that they are easier on the eyes than the black lines. The paper is bought ready prepared from the supply houses cheaper than the draftsman can make it, and the operations of making the prints are usually confined to a separate room, just off the drafting room or on the roof of the office building, where sunlight is always available.

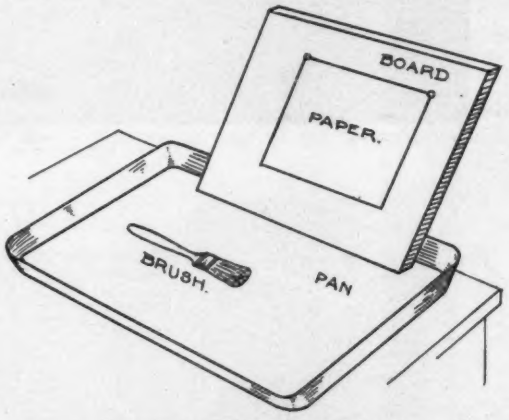
The Blueprint Formula.

We will not go into the use of the home-made paper at any great length since by far the larger number of prints are made by the use of the ready made or commercial papers. It will suffice here to give the formula for a blueprinting solution, with directions for its preparation and use, but the author knows of no valid reasons to recommend its continued use in preference to the ready-made papers. It may be used as an experiment in the chemistry class, but it is of no practical value except as a first aid in case the commercial papers are unobtainable. And for this reason alone, the draftsman and the industrial-arts teacher should be familiar with the formula and its preparation.

To prepare blueprint paper, first secure a strong white paper of an even texture and a fairly smooth surface, and cut this paper into sheets which may be handled with ease. Next prepare the two solutions which follow:—

5 parts of water by weight, to
1 part of citrate of iron and ammonia, and
7 parts of water by weight, to
1 part of red prussiate of potash.

Filter each solution and keep in separate bottles away from the light. When ready for use draw the



Arrangement for Making Blueprint Paper.

shades in the room. A totally dark room is not necessary for this work. Mix equal parts of each solution in a shallow pan or tray. Prepare a board slightly larger than the paper to be coated, and place one end in the tray so that the solution will drain from the board into the tray. Lay a sheet of paper on the board and apply the solution evenly to one side of the paper, using a soft rag, a sponge, or a camel's hair brush. Care must be exercised to avoid streaks, spots, and patches. Hang the paper up to dry and when dry keep in a dark, dry place until ready for use. Light, moisture and age are the enemies of good blueprint paper. This paper is used in the same manner as the commercially prepared papers. A description of the use of these papers will follow in a succeeding paragraph.

Commercial Blueprint Papers.

Nearly every dealer in draftsman's instruments and supplies carries blueprint paper in stock, and the retail

dealers are usually glad to sell paper in small quantities. In small towns where there are no such dealers, the person wishing a small quantity of blueprint paper will usually be able to procure the same from a local architect or factory, or from the city engineer. For the convenience of the industrial-arts teachers the trade names of the blueprint papers handled by draftsman's supply houses, are here mentioned:—

Frederick Post Company,
Primo, Standard, Commercial.
Eugene Dietzgen Company,
Radiant, Hyperion, Union.
Keuffel & Esser,
Helios, Parchmine, Columbia.
United States Blue Print Paper Company,
Cyan, Independence, Triumph.

These papers are graded according to the stock in the paper. It will usually be found that the first name given in the list above is a paper with a linen stock, the second with a good rag stock, and the third with a cheaper rag stock. Each grade is listed in three or four different thicknesses. These are called thick, medium thick, thin, and extra thin. Each grade is also listed according to speed of the solution or coating. Thus, in direct sunlight the regular paper will print in about three minutes of exposure; the rapid paper will print in one minute; the extra rapid in 35 to 40 seconds; and the electric rapid in from fifteen to twenty seconds. Electric rapid paper is sold for use in electric blueprinting machines, and prints too rapidly for successful use in direct sunlight by any but the most experienced operators. All of these papers are carried in stock in both ten and fifty-yard rolls, and in all of the following widths: 30″, 36″, 42″, 48″, and 54″, the cost of paper varying according to the size of roll and grade of paper. The cheapest paper sells at about $1.50 per roll and the best at about $10.00, or from two to fifteen cents per square yard. There are a number of companies who make a business of blueprinting from tracings furnished by the buyer. The charges for this class of work vary from one and one-half cents to five cents per square foot of paper, according to the material used.

The Blueprint Frame.

The purpose of the blueprint frame is to hold the tracing and the blueprint paper in close contact during the time of exposure. Any device which will do this, and with which tracings and papers may be changed with ordinary rapidity, will be acceptable as a blueprint frame. Frames in the most common use are of two general types—those carried and operated by hand, and those which are too large to lift by hand, and must have a pulley, a carriage and track, or some other handling mechanism.

The ordinary frame is very simple in construction. The frame itself is merely a shallow box without top or bottom. A plate of glass is fitted into one of the open sides, and the tracing and blueprint paper are held between this glass and a pad of felt, silencing cloth or cotton batting. All of these are held in place by means of the wooden back. This back must exert a slight pressure on the pad to insure contact. This is done with clamps, screws, springs, wedges, and other devices. In some of the more expensive frames, complete contact is insured by the use of a suction pump, which exhausts the air between the glass and the tracing, or between the tracing and the blueprint paper. Illustrations are shown of different types of blueprint frames.

The Blueprint Machine.

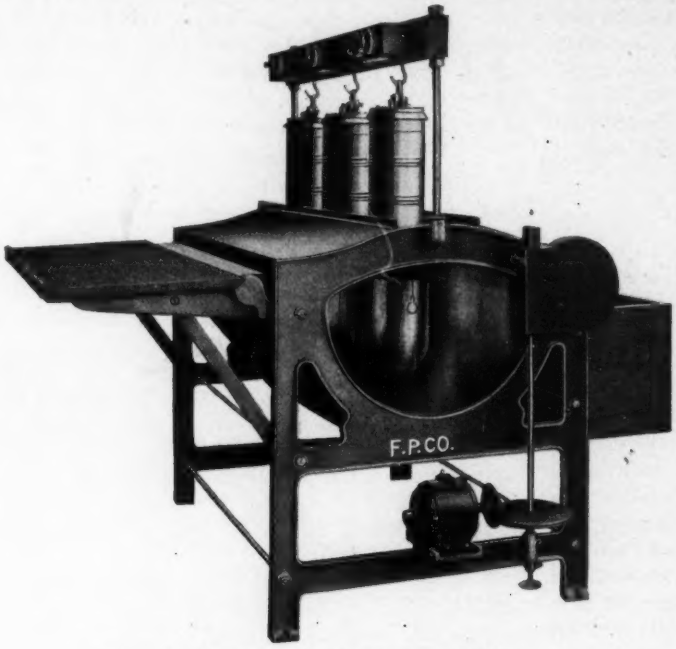
The electric blueprinting machine, altho but recently developed to a high degree of efficiency, is rapidly supplanting the sunlight method in many of the largest drafting rooms. It has many advantages over the sunlight frame, chief among which are the following: Prints may be made at night, or regardless of the weather conditions. There is a saving of time, since the electric machine, using the electric rapid paper, will print faster than the sunlight frames except under the most favorable weather conditions. Tracings were formerly often destroyed by water getting into the frame in rainy weather. Since the electric machine is inside the building this trouble is overcome. The chief objection to the electric machine is the cost to install and the cost of the power to run it.

There are many types of printing machines. The simplest type is the overhead arc. An arc lamp is surrounded by a polished reflector, in the shape of a parabola, which directs the light downward with equal intensity over the surface of an ordinary printing frame such as is used with sunlight. The lamp is supported by a rope running over a pulley, and may be raised or lowered at will.

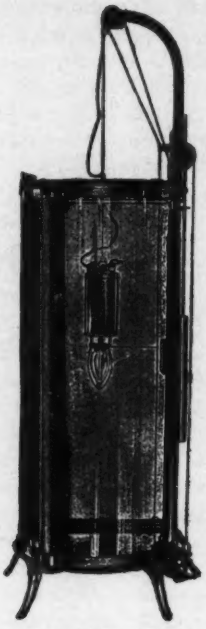
How to Make a Blueprint.

The three essentials for blueprinting are: a source of light, the article from which a blueprint is desired, and the paper prepared with a solution upon which the light may act. The source of light may be the sun, an electric arc or mazda lamp, or a very strong gas arc lamp. The article to be blueprinted is usually a drawing made with India ink on tracing cloth, altho prints are often made from tracings on paper either in ink or heavy pencil. Blueprints may be made also from drawings on heavy paper, if the paper be transparentized in a solution manufactured for that purpose. Blueprints have been made of leaves, flowers, plants, etc., and may be made from printed sheets, or newspapers printed on one side only, or even from typewritten sheets, altho these last will make a weak print unless a carbon paper has been backed up against the reverse side of the paper. In this manner specifications for material and for buildings are often duplicated for use outside of the office. The prepared paper has been described in detail in the preceding paragraphs. Directions for its use will be divided for convenience into three general subdivisions, namely, preparation, exposure, and washing and drying.

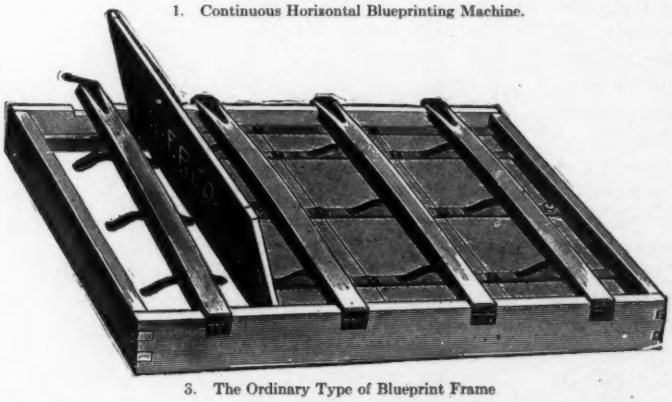
Preparation. Before the actual work of making the prints is undertaken, the paper necessary for the number of prints to be made, should be cut to the sizes needed. Do not open the roll of blueprint paper until you are ready to do the cutting. This should be done in a darkened room. A totally dark room is unnecessary. Direct sunlight, however, should be shut out, in order that the paper will not become fogged or light-struck, as this will



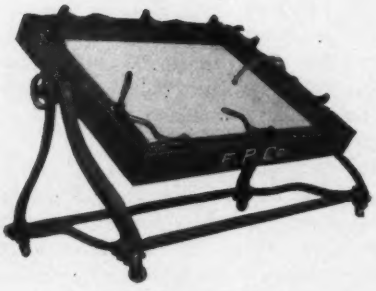
1. Continuous Horizontal Blueprinting Machine.



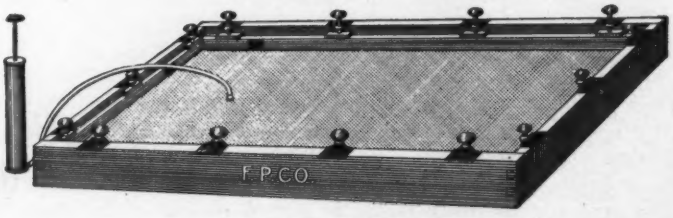
2. Vertical Type of Machine.



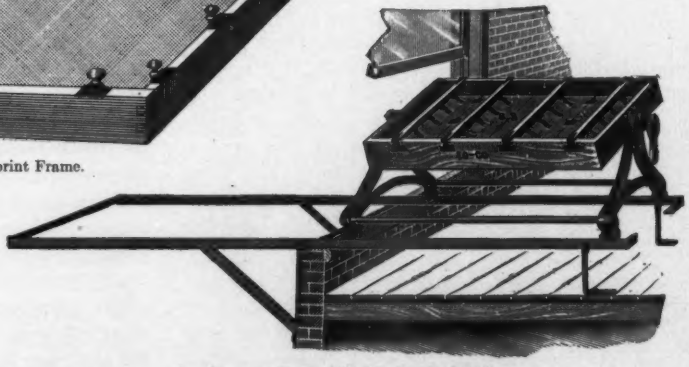
3. The Ordinary Type of Blueprint Frame



4. Blueprint Frame with Carriage.



6. Vacuum Blueprint Frame.



5. Blueprint Frame with Carriage and Rails.

Blueprinting Devices

Illustrations Nos. 1, 2, 3, 4, 6, by courtesy of the Frederick Post Company. No. 5, by courtesy of E. Dietzgen Co.

result in gray lines on the finished print. Avoid also wet hands or moisture on the table where the cutting is done. The paper should be cut about one-half to one inch larger all around than the tracing to be printed. This will allow of some movement of the paper while the operator is placing it in the blueprint frame. If several small tracings are to be made, the paper may be cut large enough for the entire lot, up to the capacity of the frame, and the blueprints cut apart during the trimming operation after they are washed and dried. A few helps in the cutting of paper may be mentioned here. If several sheets of the same sizes are to be cut, the roll of paper may be sawed into the right lengths by either hand or circular saw, and strips of paper from the resulting rolls may be rolled out together and three or four sheets cut at the same time. This is a remarkable time saver where large numbers of blueprints must be made. After the paper has been cut to size, keep it in a darkened dry place until ready for exposure.

Exposure. Remove the back and the pad of the blueprint frame and thoroly clean the glass on both sides. Next lay the tracings against the glass, with the inked side of the tracing next to the glass, and lay the paper carefully over the tracings, with the prepared side next to the tracings. The color of the blueprint paper before the exposure should be a bright yellow, if new and fresh, or a dull gray if it has been on hand for some time. If the paper be a dark blue color, it is too old to use, and has been subjected to moisture which has spoiled it. Lay the pad back in place in the frame, and see that the position of the tracings has not been changed. This may be done by lifting the frame and looking under it. Then put in the back and clamp it in place, and the print is ready for exposure.

For the exposure the frame should be placed in a position as nearly perpendicular as possible to the direction of the rays of the sun. This will mean an even exposure all over the surface of the print, whereas, if the frame be placed in an oblique position, part of the print may come out lighter than the rest. As for the time to expose the print, no rule may be given, as this depends upon the speed of the coating on the paper, its age, and whether it has been light-struck; upon the source of the light; the density of the air; direct light or cloudy weather; the seasons; whether there be snow on the ground (this increases the strength of the light); the time of day; the thickness and the transparency of the tracing; and whether a light or a dark print be wanted. If a very dark blue is wanted, the print is often slightly over-printed or over-exposed, and then washed in some chemical solution. For the amateur, a very good plan is to make a print which is satisfactory, watching the time required, and to follow the same time for the rest, if the light is steady. If the light is unsteady, or if for any other reason the operator does not care to watch the clock, good results may be obtained, after very little practice, by watching the projecting edges of the paper from the front of the frame. Where the paper projects over the edges of the tracings, its color may be seen to turn from the bright yellow of the fresh paper to a dull gray, and finally to a speckled greenish gray, at which color it is best to remove it from the frame. If left in the frame longer, it will gradually turn lighter and lighter, until nearly white. At this point the lines are a greenish blue, since the light has succeeded in penetrating the inked lines of the tracing. Needless to say, the blueprint is spoiled, and if washed will show a solid gray field, while the heaviest lines will be barely perceptible.

Washing and Drying. After exposure, the blueprints should be kept in a dark place until ready for the washing. If absolutely necessary, they may be kept thus for several days, but it is better to wash at once. Clear, running water is the best medium for washing. If one cannot have this, it is well to change waters frequently, as the sediment from the paper will settle on the prints and make them spotted. Prints should be thoroly covered by the water at once, and left in water for several minutes. If they are under-exposed, they will appear light blue, and this cannot be darkened. If they are over-exposed, or "burned," they may be brought back to a dark blue, or "bleached" by washing in a solution of hydrogen peroxide and water, and then washed or rinsed in clear water. Another solution often used for "bringing back" over-exposed prints is the potash solution. This is cheaper and better than the peroxide solution but more troublesome. It is made by dissolving crystals of bichromate of potassium in water to form a weak solution. This may be kept in bottles away from the light for future use. The print is first washed in water in the regular way, then transferred to this solution and allowed to lie in it for several minutes, and then washed a third time in clear water to remove all traces of the sediment which may be formed on the print by the potash solution. By this method good prints may be darkened, and burned prints brought back to a good color, and the solution is further said to have a fixing power upon the prints, so that they will not fade so easily when exposed to direct sunlight. It is well for the operator to remember this axiom in making blueprints: The fresher the paper, the longer to print and the quicker to wash; and the older the paper the quicker to print and the longer to wash.

Notes and Dodges.

Tracings too large for the frame at hand may be blueprinted by sections, and the different sections thus made, pasted together.

White lines may be drawn on blueprints, or additions and alterations made with solutions of soda, potash, or Chinese white.

In the absence of a frame, a fair print may be made by holding both tracing and paper against the window pane with a firm pressure.

Blueprints may be made from drawings on heavy paper or even cardboard by transparentizing the drawing in benzine or gasoline, and exposing while the drawing is still wet. The benzine will not harm the blueprint paper.

BOYS BUILDING CONCRETE RETAINING WALL.

PROBLEMS IN CONCRETE

Milan G. Twichell, Falmouth, Mass.

IN the May issue of the INDUSTRIAL-ARTS MAGAZINE, "Manual Training Director" makes a request for problems in concrete for the upper grammar grades. I think that question might be answered by a suggestion, that the problems are limited only by the ability and experience of the instructor, or, perhaps a better way to put it, by the instructor's knowledge of the subject of concrete. There are many problems in concrete work that might be worked out successfully by the upper grammar grades. Some things that are both practical and useful are concrete walks, steps, flower pots, flower-pot stands for out-doors, retaining walls, settees for lawns, stepping blocks for front and side doors, and many other useful articles. If the instructor knows how to make the moulds for these things, the rest is easy.

One very practical problem that was successfully worked out with eighth-grade pupils of the Practical Arts School at Fitchburg, Massachusetts, was the building of a retaining wall with a quarter turn, the radius being about twelve feet. This wall was about fifty feet long, ten inches thick, and about two and one-half feet in height above the ground. In surveying for this wall, it was found necessary to have one end of the wall higher than the other end to make it conform to the grade of the ground. Therefore, about 35 feet in length was made level, and the remaining part was made on a slant upward of about twelve inches. All of this rise was made in the quarter-turn and the remaining three feet of wall. The forms for the quarter-turn were made in the work-room, then taken out and set up to connect with the form for the straight part. In mixing the concrete for this wall, no wooden "bed" or mixing-board was used, as we had a good concrete walk to mix on. The boys were taught the different mixtures to use for the part underground, and that above ground. For that part of the wall that was under ground, we used a mixture of one part cement and four parts sand. For the part of the wall above ground, we used a mixture of one part cement and three parts sand, and topped it with a still stronger mixture. We used a sharp, coarse sand, and small stones which varied in size from about one inch, to two and one-half inches in diameter. In measuring the sand and stone, we used a wheel-barrow, for with experience it will do as well as the measuring-boxes, and it saves time.

To determine the amount of cement, sand, stone, or gravel to be used, first figure out the number of cubic feet of concrete that will be required for the work in question. Then by multiplying this number by the number under the proper column and required mixture shown in the table below, the amount of cement, sand and stone or gravel can be found.

Quantity of Material in 1 Cu. Ft. of Concrete.

	Cement Bbl.	Sand Cu. Yd.	Stone or Gravel Cu. Yd.
1:2:4 mixture	.058	.0163	.0326
1:3:6 mixture	.041	.0174	.0348

It is always wise to have a small quantity of cement left over if the dealer is at a considerable distance; if in the city, it is very easy to get one or more bags of cement if needed.

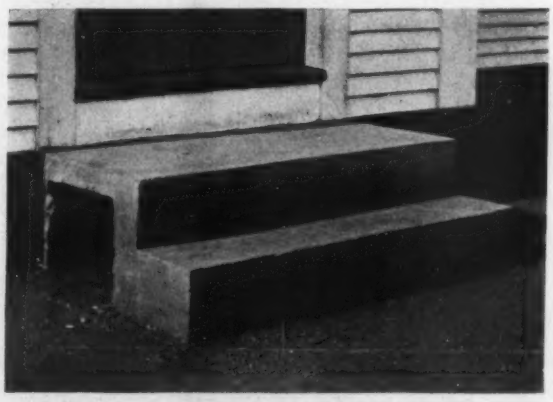
Mixing Board.

A good concrete board for mixing is necessary, if you have a large quantity to mix. If a small quantity is to be used, almost any small concrete board or small

Editors' Note:—Mr. Twichell is a graduate of the Practical Arts Class of the Fitchburg Normal School and has been Supervisor of Manual Arts at Falmouth, Mass., this past year.

box will do. A board 9'x10' will be large enough for a "Two-bag Batch." It should be made of one-inch boards, surfaced on one side, using five 2"x4"x9' cleats to hold them together. The surfaced boards will make the shoveling easy. Lay the boards so as to shovel with, and not against the grain. Nail a piece of 2"x2" or 2"x4" around the edge of the board to avoid losing any of the cement grout. Cement "grout" is a mixture of cement and water. Have your board level, and as near your forms as possible. In mixing, first put down your measured sand, spread out in a layer three or four inches thick. Take your measured cement, and place as evenly as possible over the sand. Two boys, one on each side of the board, start mixing the sand and cement, each boy turning over the half on his side of the board by beginning at one end and shoveling away from his feet. Do not simply turn it over, but let it run off the shovel so that the cement and sand are mixed as they fall. If this is properly done it will be sufficient with two turnings. Spread this mixture out evenly and place the gravel or stone on top, spreading this out evenly also. Then pour on the water, being careful to wet all of the gravel or stones. Do not put on too much water the first time. Starting the same as with the sand and cement, turn the materials over in much the same way, except that instead of letting the mixture drop off the shovel, dump the load in a heap and drag the point of the shovel toward the mixer. After turning once, begin where you left off and turn the materials over again. It should be well mixed after three turnings. If there are any dry spots, it must be turned again.

The concrete is now ready to be placed in the forms. We used what we called a medium mixture, just wet enough to make it jelly-like. It was tamped down with a tamper to remove the air bubbles and fill the voids, care being taken to have all the stones kept back about



Steps Made by Boys.

one inch from the forms. After the concrete was "set up" we took the forms away and smoothed the sides and top of the wall. Then we painted them with a mixture of cement and water. After this was "set up" we covered the wall with heavy canvas and wet it thoroly, doing this for about one week. We had a nice wall, smooth and hard. As we desired to have this wall completed at a certain time, we had the boys work for some time doing all of the work, mixing, placing, etc. Then we employed two men to mix the rest of the cement, the boys doing the placing and all the rest of the work. If any instructor thinks it is an easy task to mix concrete for one-half or one whole day at a time, just let him try it. I have tried it, and know just how many backaches there are in a bag of cement. The photograph shows the eighth-grade boys at work, mixing the concrete.

The steps in the photograph were built by the boys in the freshmen class of the Falmouth, Massachusetts, High School. The forms for these steps were made in the workroom, and then taken out to one of the schoolhouses in an outlying district, and set up. The foundation for these steps is about twenty or 24 inches below grade, filled with crushed stone and covered with cement. These steps were to replace wooden ones that were decayed and unsafe. To get under this schoolhouse, the old wooden steps had to be moved out of the way, there having been left an opening between the underpinning stones large enough to allow a man to get thru to do any repairs that were necessary to do under the building. It was a very poor arrangement, there being no cellar, only a "dug-out." We made an opening in the concrete steps large enough to allow a medium sized man to get thru without any trouble. The top tread was reinforced by laying an inch and one-quarter pipe on the back side next to the underpinning, and one on the front side of the steps about four inches back from the face of the riser, and even with the top of the opening. Then pieces of three-eighths-inch gas pipe were laid on top of these long pipes, running from the underpinning out to within two inches of the face of the riser. These pipes were put six inches apart, then a piece of heavy galvanized "three by three" mesh, cellar window screen wire netting, was fitted to lay on top of these pipes, care being taken to have about one-inch margin between the wire and the form. The top was then filled with concrete and well tamped down, the crushed stone being omitted above the wire. A mixture of 1:3:6 (1 cement, 3 sand and 6 crushed stone) was used in these steps up to the wire netting, and a mixture of one cement and two of sand above the wire, finishing the last one-half inch with a mixture of one cement and one of sand, well tamped and smoothed. After these steps were "set up" they were painted with a mixture of cement and water, and then covered up. When "set up" they were wet down every other day for a week or more, and when dried out, they were very hard and smooth.

These steps are about five feet long, with a top tread 24 inches wide. The lower tread is twelve inches wide. The risers are nine inches. This piece of work furnished the boys practical experience and they enjoyed every part of the work from beginning to end. We built two sets of these steps, using the same form. We also built two large single steps, about four feet by five square, with a nine-inch rise. These are good practical problems for the boys, something that the boys can do, and do well.

PROBLEMS IN DESIGN

Bonnie E. Snow, Millburn, N. J.

(Lesson VII)

1. Design as a Mental Stimulant.

WHY do we study Design, and what is its value as the basis of art training? A clear and definite answer to this question should be forthcoming. Any study is of value that sets in motion the processes of constructive thought. Design makes us *think*, and thinking cannot be accomplished without a greater or less degree of mental activity. The thinking mind is the growing mind, and healthy growth is bound to result in strength. We study design, too, that we may enter the world of the originator and the inventor; that we may appreciate the results of his labors; that we may enjoy the workings of a stimulated and enlightened imagination; and that we may participate, as far as may be possible, in the delight of invention, ourselves. Let us remember that self-expression consists in the exercise of choice, quite as much as in the spoken or written word, or in the illustrated sketch or diagram. A man is known by the company he keeps. Our taste and personality are shown in the friends we select; in the books we collect; in the pleasures we choose; in the vocation we follow; in the houses we live in, and in the clothes we wear. A knowledge of design helps us to make a right choice, because design is constantly demanding that we estimate proportions, that we harmonize colors, that we judge of relationships, and that we decide upon arrangements. This exercise of choice is mental training, rather than emotional indulgence.

Leonardo De Vinci is said to have invented the wheelbarrow; he was also a painter of Madonnas. It is probable that more of his mental energy went into the invention and designing of the wheelbarrow than into the greatest Madonna that he ever painted. Both wheelbarrow and Madonna have their places in the progress of civilization; but the wheelbarrow may be said to typify the industries that must be exercised by the many, and the painting of the Madonna represents that form of art that must ever be left to the few. To design a tea-cup is an accomplishment of more importance than to draw from the object the outline of a tea-cup, because the former taxes the creative faculties and the latter simply records observation. Hence a training that stimulates or develops original thinking is more useful than a training that aims merely to set down or record, however accurately.

In the elder days of art, no one thought of studying design. Good taste, sound judgment and skill in the craft came thru long years of apprenticeship, spent under the tutelage of strong masters. Principles of Design were then felt, rather than formulated. Simplicity, sincerity, individuality were expressed in the work of the craftsmen because they themselves were simple, sincere and individual. They did not borrow outward forms and symbols; they expressed their own ideas in their own way. It is in the effort to establish the work of our times upon a similar foundation that we seek to discover the principles which these masters observed, perhaps unconsciously. In following a principle, it is possible to exercise the greatest freedom, so that our work while it conforms to principle, should also bear the stamp of original thought.

In the working out of these simple problems we shall discover a growing appreciation of fine things in general, we shall attain a surer judgment and we shall enjoy an increasing ability to think for ourselves in matters artistic and useful.

2. Structural Design, Continued.

In our last lesson, structural design was defined as being that phase of design which emphasizes or repeats the lines or elements of structure in an object. When the form upon which we are to work is characterized by vertical and horizontal boundary lines, as in any rectangular surface, structural design will suggest a unit of decoration that is also based on vertical and horizontal lines. The table-runners shown in Figures 1 and 2 are

Fig. 1. Structural Design Woven in Scarf by Blind Women at Cambridge, Mass.

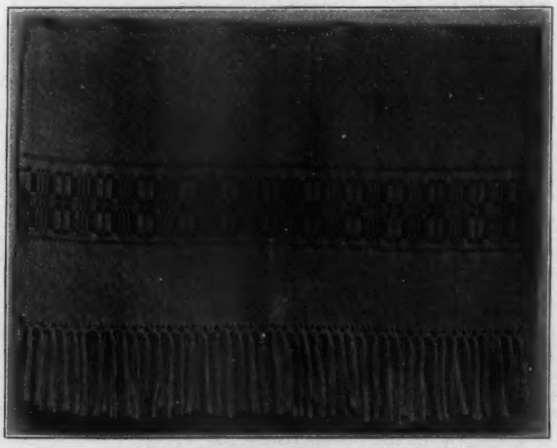


Fig. 2. Another Sample of Structural Design, Woven as Part of the Fabric.

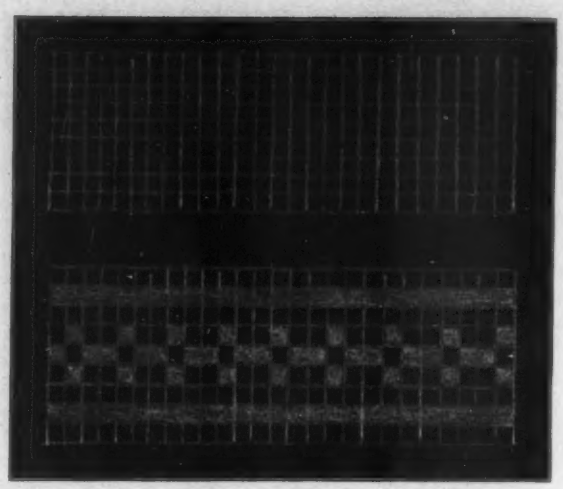


Fig. 3. (above). Quarter Inch Squares, Ruled on Black Paper, as a Basis for Designs.
Fig. 4. (below). A Simple Unit Repeated to Form a Border.

fine examples of the use of structural design as applied to the weaver's art. These borders, in beautiful color schemes, are woven as a part of the fabric, on the same loom, and at the same time, by the blind women weavers of Cambridge, Mass. The Massachusetts Association for Promoting Industrial Education for the Blind is responsible for the fine equipment of the shop, and for the high class instruction that is provided. Miss Carmela Valva, a designer of rare ability, plans the decorative arrangements with especial reference to their use in weaving, and the blind workers weave from dictation.

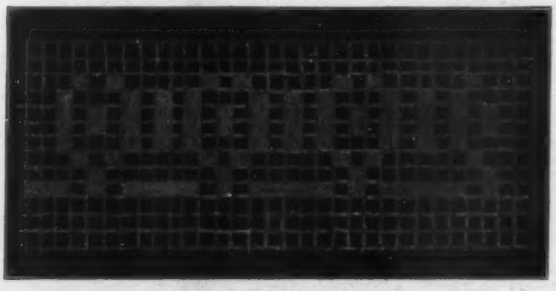


Fig. 5. An Idea Taken from Fig. 2.

These two interesting borders have supplied the inspiration and suggestion for all the other illustrations that follow in this lesson. The teacher who has a collection of fine examples of work, or who has access to a museum, or to photographs of museum treasures is fortunate indeed, for such material gives the teaching of design a new meaning and a fresh delight.

The arts of knitting and crochet are old and universal. Italians and Poles, Swedes and Germans, Russian Jews and French peasants all know how to crochet,—at least the women-folk do. The designs which they employ are nearly always of low standard, because the effort is constantly made to approach the realistic ideal, rather than to follow laws of arrangement. Hence their crochetted and knitted laces and trimmings are, as a rule, unbalanced, non-rhythmic, unrelated to background spaces, and without "quality" as design. But in the work of these foreigners who fill our factories and farming lands is knowledge of the craft,—a useful industry, that should be nurtured and developed and spread among American school children. Let us train the children of foreign parents to make better designs, and urge the foreign-born mothers to teach the children the crafts of the old country. As a beginning, let us plan some structural units that may be worked out in fillet crochet.

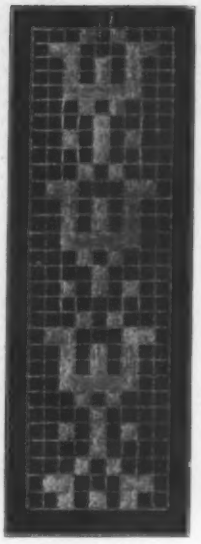


Fig. 6. The Same Unit, Slightly Modified, Repeated Vertically.

3. Design for Fillet Crochet.

As an aid in planning such units, squared paper is most convenient. In this case we will rule our own squares. Select a sheet of dark brown, dark gray or black paper and fasten it to a drawing board, so that the T-square and triangle may be accurately used. With

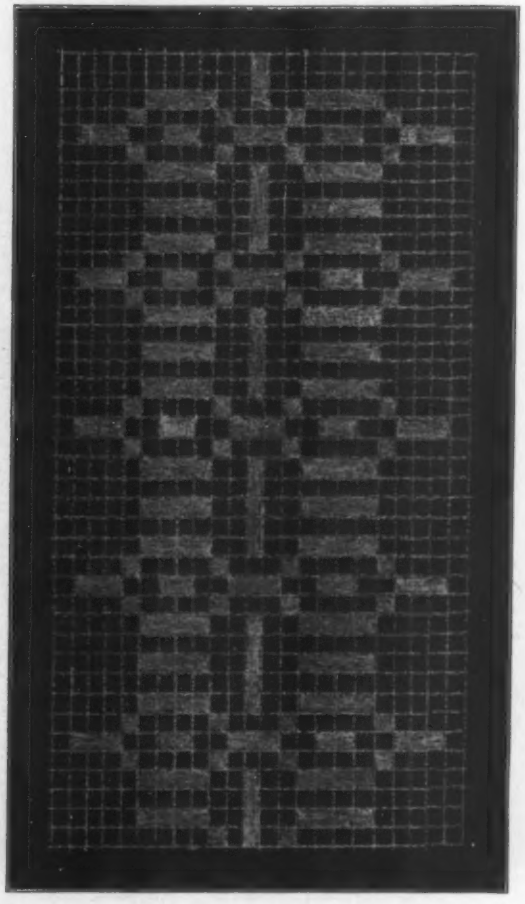


Fig. 7. Another Adaptation of the Unit, to Form a Broad Band or Panel.

Fig. 8. A Border with Corner Motives.

a well-sharpened stick of white pastel crayon rule a set of horizontal lines a little less than a quarter-inch apart. (After a little practice this spacing can be done free-hand). Rule now a set of vertical lines to make the squared strip shown in Figure 3. You must now decide whether you will design a horizontal band for band insertion, a vertical band for a panel, or an arrangement within a rectangle. Figure 4 shows a very simple unit, repeated to form a band that might be used either vertically or horizontally. In this arrangement, simple as it is, the relation of unit to unit, of unit to background, and the width and position of marginal bands, have all been considered. This is what is meant by designing with reference to principles of arrangement.

Figure 5 is another arrangement, of increased interest. Can you detect its origin, in the unit employed in Figure 2? Figure 6 shows the same unit employed as a vertical repeat and Figure 7 shows still another variation, resulting in a decorative panel, or wide band. When worked in heavy linen or cotton thread, fillet crochet combines effectively with hand-woven Russian crash, of a coarse and somewhat irregular weave. Figure 8 shows a design for a decorative band and corner, which might be applied in a square mat or doily, the whole border with the corners having been crochetted as a unit, and then inserted in the crash square.

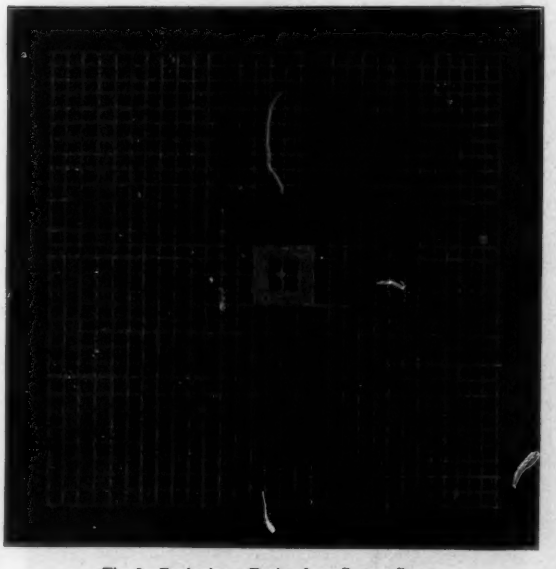


Fig. 9. Beginning a Design for a Square Space.

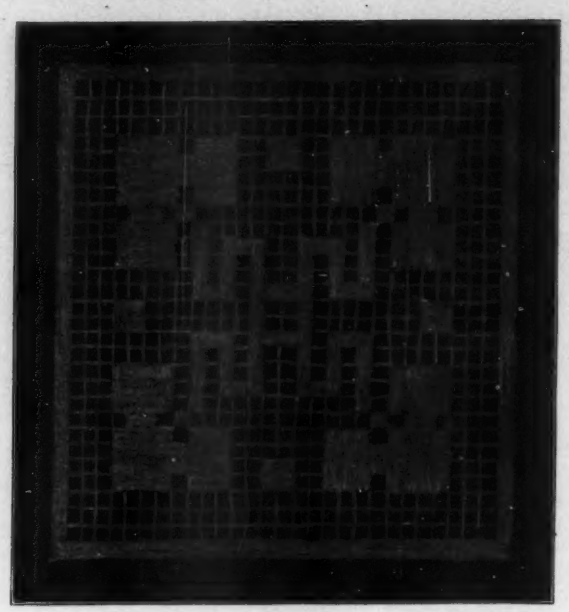


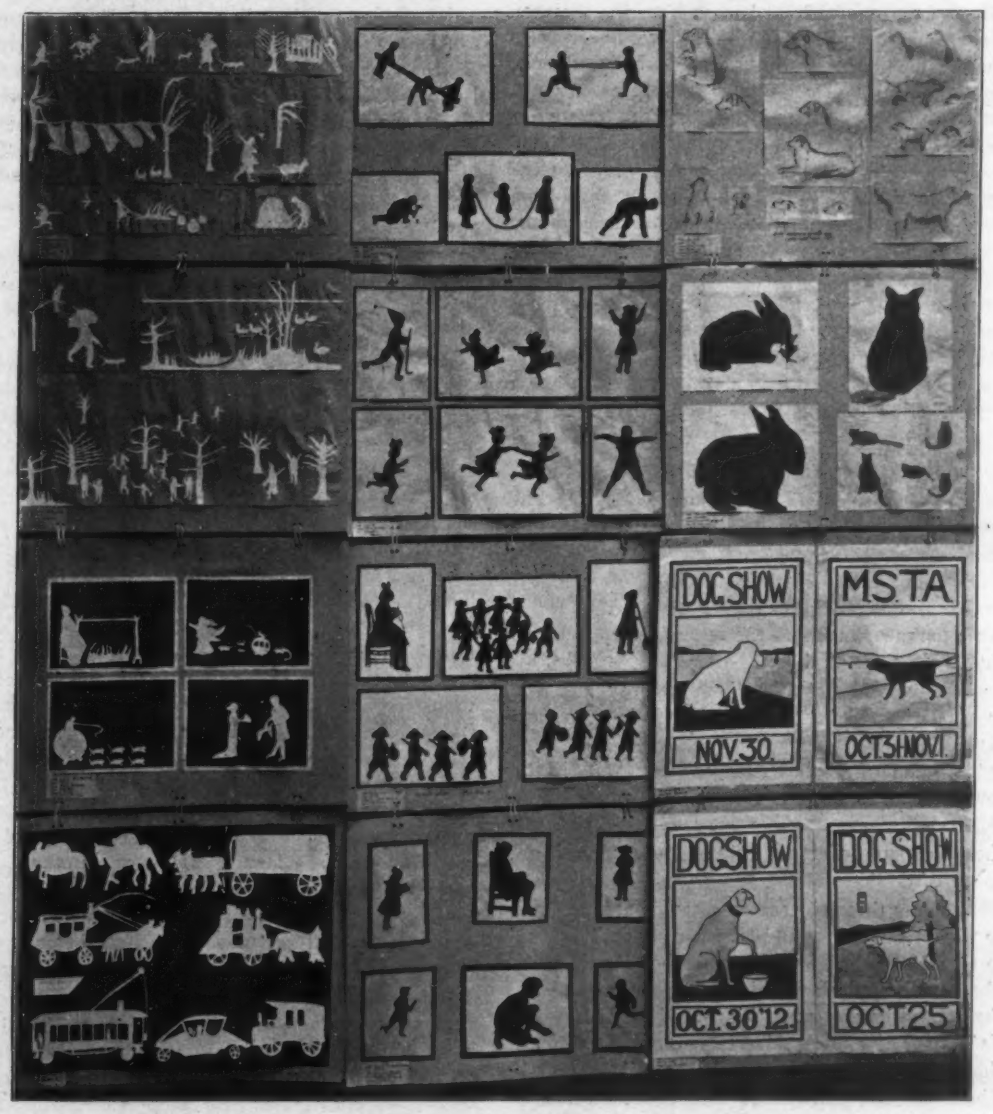
Fig. 10. A Design for a Square Medallion, to be Worked out in Fillet Crochet.

Fig. 11. A Bag Designed by a Sixth-Grade School Girl, and Worked Out by Her in Fillet Crochet.

From borders and panels worked out in these simple straight line designs, it is an easy step to the invention of arrangements to fill square or oblong spaces. Here, again, structural design limits us to the use of vertical and horizontal lines. Starting with a square net (Figure 9) we first count the squares to locate the center. As a first step, we enclose the center group of four squares with a band, one square wide. After this, whatever is added on one side of this band is immediately repeated on the other side. Or, a design similar in character to this might be worked out by developing first a corner arrangement, and then repeating this arrangement in the other three corners. Good results, however, are a little surer if the start is made at the center.

A sixth-grade girl in the schools of Passaic, N. J., designed and made the attractive bag shown in Figure 10. Coarse linen thread, ecru (gray-orange) in color, was used in crochetting the design, which was first planned on squared paper. A lining of gray-orange satin was used and two button molds were covered with crochet to which were fastened the ends of a strong crochetted cord. The bag was useful, beautiful in its fitness to purpose and in its originality, and was not at all beyond the average ability of a grammar school student.

In the home industries of our foreign citizens, let us preserve that knowledge of the craft which is so eminently desirable, and let us try to combine with that knowledge an understanding of the requirements of good design.



DRAWING AND PAPER CUTTING DONE IN THE SCHOOLS OF GRAND RAPIDS, MICH.
Shown at the Convention of the Western Drawing and Manual Training Association.

INDUSTRIAL-ARTS MAGAZINE

Board of Editors

WILSON H. HENDERSON . . . . Hammond, Ind.
S. J. VAUGHN . . . . . DeKalb, Ill.
E. J. LAKE . . . . . Champaign, Ill.

EDITORIAL

MAINTAINING A BALANCE.

THERE is an important ingredient of success not to be gained from study, from books, from the shop, or from the association with one's fellow workers. It is the strength and the levelling, broadening influence which comes from the association of persons of one profession with those engaged in other pursuits.

Teachers have been accused of narrowness, of provincialism, of one-sideness. Without stopping to discuss the merits of such a charge, it may be stated as a truth, that there is nothing so influential in preventing or overcoming such defects, as association with men and women engaged in law, medicine, manufacturing, merchandising, etc.

This may be safely prescribed as an effective means of acquiring poise, of gaining standing in the commerce of universal thought, and of taking on the balanced, sane and tolerant attitude of the cosmopolitan.

DESIGN VERSUS STYLE.

We have been confidently informed that "The Fall styles are to be very full in the skirt and very close in the bodice."

We predict that this sudden reversal of style will do much to promote trade in dress goods.

Those narrow skirts and the mincing step must go.

They will be out of style.

Most of us did not like them anyway and Oh! What a relief it will be to take a good, long, natural stride again.

But! Some of us have looked very well in the Summer style and some of us will not look so well in the new Fall style.

There *is* some difference between looking *well* and looking *stylish;* yet:—

"How many things by season season'd are
To their right praise and true perfection."

So says Portia! You will remember Portia as the lady who scored Shylock for his mercenary methods.

Shylock no longer exacts his pound of flesh:

He has a better method! *He changes the style.*

Shall we revolt and design our own styles?

Where are the Portias of this twentieth century who will dare to design and wear versus style?

Shall we not make of style a free-for-all race in a free-for-all country?

Or shall we continue to follow the style set us by Shylock and pay his price in lack of taste and loss of dollars?

Can we continue to pay such an exorbitant price?

It has been pointed out to us that we are "paying the price of *high living* rather than the *high price* of living."

If the extreme styles of the season betoken high living, as we are inclined to believe they do, let us substitute careful, thoughtful design for the will-'o-the-wisp of style.

SPEAKING OF SALARIES.

We are in receipt of the following:

"We are desirous of employing an instructor at an early date to devote a part of his time to our Teachers' Course in Manual Training, which is a four-year collegiate course with college entrance requirements for admission. Another part of his time will be given during the first year or two of his appointment to teaching Engineering Drawing to Freshmen. A six weeks' summer session which will be the most important part of his work, consists of the teaching of Manual Training methods to teachers from the smaller schools who come to us during the summer session, most of whom have had very little general education.

"We require a man of attractive personality, with characteristics that would make him particularly popular with teachers attending summer session. He should be able to make picturesque presentations, be the possessor of a good store of lantern slides and examples of hand work in the lower grades. Such examples should illustrate rather an industrial tendency than any tendency towards fine arts. He should have the desire for accumulating such material. He should possess sufficient technical education to be able to teach classes in engineering drawing, including descriptive geometry during the year. He should be thoroly familiar not only with educational history and the classic writers, especially the methods of Froebel, Herbart and Pestalozzi, but also with the various divergent modern schools of educational theory as pertaining to hand and eye training. manual arts, arts and crafts, vocational education and industrial education. He should possess a thoro knowledge of the writings of Goetze, Salamon, Carlton, Rouillion, Person and other modern writers, in addition to being a reader of current periodical literature in this field.

"It is our idea to put this man in charge of the summer session work of this department. We would pay this man a salary of $1500 per annum. The instruction in Engineering Drawing would drop out altogether just as soon as there is a sufficient number of students taking the four-year teachers' course in Manual Training to warrant employment of an instructor's entire time at this work."

Like the boy at the Zoo, we must reply: "There ain't no such animal."

BLIND ALLEY LEGISLATION.

IN the Report of the Indiana Commission on Industrial and Agricultural Education, "Finding" No. 3 states: "The larger part of the boys and girls leave school before the completion of the elementary course,

unprepared in anything which will aid them in their immediate problem of earning a living with their hands. From statistics available in other states it is safe to estimate that there are fully 25,000 boys and girls in this state between 14 and 16 who have not secured adequate preparation for life work in the schools and who are now working in 'dead end' or 'blind alley' jobs, or in other words, jobs which hold no promise of future competence or advancement."

On the basis of the "Findings" and "Recommendations" of the Industrial Commission, a Vocational Education Law, supposedly designed to correct the evils mentioned in the "Findings", was enacted by the State Legislature. In a bulletin giving information regarding that law, we find the following: "A part time class which seeks primarily to extend general educational facilities to young workers for the purpose of increasing their fund of general information or which aims to give workers *vocational training designed to fit them for another higher or more remunerative occupation or trade does not fall within the scope* or *intent* of part-time classes as defined by our law." In another place we find "It is important to provide a means whereby the workers who have gotten into 'blind alley' jobs may be able to fit themselves for a more skilled occupation, *but a school having this for its aim cannot be state aided under the law.*"

Is the controlling purpose of all of the talk about "blind alley" jobs merely to excite popular feeling and sympathy, in order that a law, supposedly designed to relieve the conditions but in reality sentencing the children for life in their blind alley jobs may be "put across"?

If there is a *controlling* purpose, i. e. a restraining or retarding purpose, in all of this propaganda for industrial education, it will not endure very long. We favor industrial and vocational *education* which will benefit the low skilled workman in a low grade industry, and enable him to improve his condition by improving himself. We believe that when a school sends its graduates into the world, they should have something to sell; should be able to render some service to society, for which society will be glad to give them their living. But we do not favor any scheme calling itself educational, which seeks to restrain or retard the progress of boys and girls.

EDUCATIONAL HELPFULNESS.

THE day of profitable selfishness is rapidly passing. The man or institution whose enquiry is, "What is there in it for me?" is out of harmony with the spirit of the times. There are eternal verities to be reckoned with even in the field of sharpest competition.

When questions of educational policies turn on points of personal interest; when recognition is given or withheld because of the narrow vice of envy, prejudice, or jealousy when opinion, word, or deed takes its significance entirely from its source rather than from its worth, then education must speak with a lisp and educational progress must walk with a crutch.

The ambition of the INDUSTRIAL-ARTS MAGAZINE is to give full publicity to worthy thought and deserving deeds without regard to their source. It has the interests of no particular institutions or individuals to champion; it has no coffers to fill; it has no goods to sell. It proposes to give credit to whom credit is due, whether ally or competitor, and to withhold recognition from no worthy agency of educational progress.

VOCATIONAL TRAINING APPLIED TO TEACHERS.

THE persistent note in present day discussions of educational affairs is the necessity for training for the specific work which one is to follow.

It is a strange contradiction that some of those who are the strongest advocates of this doctrine when applied to plumbing, cooking, clerking, etc., should at the same time deny the necessity for such special preparation in the art of teaching by those who propose to teach.

Teaching is perhaps the most difficult art to acquire. How few really *superior* teachers there are! Hence, what a tremendous error we make when we assume that all that is necessary to teach a subject is to have a technical knowledge of that subject. A young lady teacher would do about as well on a difficult job of plumbing, as a mechanic, without special aptitudes or preparation for teaching, would do in trying to teach a class of boys.

Fortunately for us, there are a good many people in the trades who have aptitudes in the direction of teaching and dispositions to undertake such work under proper conditions. Inducements should be held out to such persons to take such training as will help them safely and profitably to engage in the work of teaching our boys and girls.

"This is the experience of other manufacturers with whom I have conversed on this point. As compared with the average mechanic who has served an apprenticeship in the regular way, the average boy who gets rudimentary instruction in the manual training school, supplemented by a short period of shopwork, has greater initiative, alertness and versatility. He is quicker in grasping new ideas. He has greater skill in meeting new conditions, and greater power in shaping them to his purposes. He rises faster and farther, and wins higher positions and commands a larger salary."—*James W. Van Cleave,* President National Association of Manufacturers.

A SURVEY of local industries has been begun in El Paso, Tex., preparatory to the installation of a strong Vocational course in the new high school. The data is to be filed in the superintendent's office for reference at the inauguration of the new study.

In commenting on the aim of the high-school course, Supervisor W. A. Burk said: "We want the Vocational work taught in the high school to train the pupils for work right here in El Paso, so we want to thoroly understand the situation in the industries here and find which offer the most opportunities for our pupils and what line of work we can carry out with the best results. As the commercial branches, bookkeeping, stenography and business branches are always in demand, this department must be greatly enlarged in the new high school building as it is already greatly overcrowded here in the present building. There is always a demand for good draftsmen, so that will be emphasized in the new school.

ANNUAL CONVENTION NATIONAL ASSOCIATION OF CORPORATION SCHOOLS

THE National Association of Corporation Schools held its second Annual Convention in the Curtis Building, Philadelphia, June 9th to 12th, inclusive. The three days were devoted to discussing ways and means for increasing the efficiency of schools operated by the various corporations composing the membership of the Association.

The following extracts are from addresses made during the meeting:

THE PURPOSE OF THE CORPORATION SCHOOL.

One of the principal concerns of the present day is the introduction of a higher standard of education in our industries and generally. Education should include not only the technics of a given industry, but should be of a broadened nature, leading to the highest attainable individual development of health, including hygiene and recreation. Knowing how to play is as important as the knowing how to work. Perhaps the greatest personal crime of the century is contributory negligence to poor health.

Less than six per cent of our population now enjoys more than a secondary school advantage. This includes the high school, the training school and the university. In other words, about 96 per cent of our population goes into its life's work without any systematic training or education beyond the point of graduation from the elementary school and the result of later environment. Is it strange, therefore, that seldom does the right man find his right place either in industry or in society? Can we expect other than that the field for the agitator, demagogue and incorrect theorist will find fallow ground?

The National Association of Corporation Schools is an organization for bringing together the employe and the teacher, and the schoolmaster of industry. These schools are training the worker; they give him a chance which eventually at least it is hoped will give the man of a high school or university no greater start in life than he can enjoy. Apart from the personal and social value to the individual, they are greatly increasing the earning power of the educated man. Thus upon investigation we find that the man in the industrial world who has had no training other than that of an elementary school has an average earning power thruout his life of approximately one-quarter the average earning power of the graduate of the university. And what is probably of equal importance, a graduate of an elementary school finds his maximum place in life at about the age of 20, whereas the man of a broader education does not reach his maximum efficiency and earning power until about twelve or fifteen years later.

Industrial education primarily benefits the employer, and he can most afford to pay—in fact he cannot afford not to pay—for that which improves educationally his employe. Without higher standards of industrial education, as well as a larger measure of personal education, we cannot hope to hold our proper place, at least economically, among the industrial nations of the world.—*Arthur Williams, New York Edison Company, President of the Association.*

HEADS AND FLOOR SPACE.

The new type of industrial leader has a different conception from that type of leader who thought men were but a part of the machines they operated. The man handler must indeed be a leader who has gone to school to his workingmen to know them—the workingman must go to school to the businessman that he may learn what are the real problems of production, distribution and financing—that he must learn it is easier to make than it is to sell—that it is infinitely easier to put money into a business than it is to take profits out.

It is in the handling of such simple and elementary problems as these that harmony and efficiency lie—and the association will do a great work in teaching both the aristocracy of management and the democracy of the workingmen. For of a truth, indeed, there will be more square feet in all our factories when the square heads have been eliminated.—E. St. Elmo Lewis, Advertising Manager Burroughs' Adding Machine Co., Detroit, Mich.

WHAT THE PUBLIC SCHOOL MUST DO.

We may talk efficiency and education until the end of time, but until we fearlessly and honestly meet the question of illiteracy we will not progress far. No one individual can say what the remedy for illiteracy should be, but I will outline briefly along what lines, in my opinion, an investigation should be made. Little will be accomplished until the corporations co-operate in the movement.

First, We should couple up the school with industry. In order to do this, compulsory education should be extended to 16 years, and it should be uniform in all states. A study of the present school curriculum should be made by the corporations in conjunction with the school authorities with the idea of outlining such courses that would fit up better with industry.

Second, Make every school an employment bureau and clear thru a central bureau supported by the corporations. Nearly all corporations have a wage scale sufficiently elastic to work out a regular line of promotion. For example, a boy of 16, just leaving school, should be started in at a low rate and gradually increased until he reaches about 25 years of age. This increase, of course, to be based on efficient service. This would teach him to respect service and income.

This is not a question of charity or philanthropy, but a basic question of economics. Our pauper population is growing at an alarming rate. We ought to determine just how much our methods of employment and education are responsible and correct it.—*N. F. Dougherty, Pennsylvania Railroad Co.*

THE FAILURE OF PUBLIC EDUCATION.

Four-fifths of the population, which should now be receiving training in the experiences of life, are instead thrown upon the world, receiving nothing but hard knocks that drag down or kill two-thirds of them.

Sixty per cent of the children in our public schools leave during the sixth grade or at the end of the fifth. In New York City today there are 90,000 children who have left school during these grades. These children are receiving no supplementary education—they are either running wild, without employment on the streets, or they are pushed into a "dead end" job. Philadelphia has 18,000 of these misfits.

In Milwaukee, on the other hand, these children receive definite instruction. In Milwaukee there is no opportunity for the child who has left the fifth and sixth grades to get away from some kind of continuation training. The truant system in Wisconsin has been so elaborately worked out that the only possible way for the child to escape school is either to be armed with a physician's certificate saying that he is unable to attend, or else he must practice most marvelous kinds of "artful dodging."

The schools need shaking up.

Thirty-three per cent of the state superintendents of schools are elected by popular vote. They must essentially be politicians. It is their duty to please everyone insofar as possible and to stand in the way of no one. Incidentally they are school teachers as far as the situation permits.

The public education is a hopeless jumble, having no system or organization. Education is whatever undirected, countless, kindly, inexperienced, willing, Godly school teachers of several localities make it. It is what they and their threadbare cloak of professionalism make the uninformed and uninterested lay mind believe is the common practice and tradition.

There is one definite duty before us. The children of America have the right to go to school to obtain all the help that the government of their city, state and country can give them.

The confusion of simple differences cannot longer prevail. The schoolmaster must speed up, be resolute and of good cheer and make the school of childhood what it ought to be and what he alone can make it.—*H. E. Miles, President Wisconsin Board of Industrial Education.*

ATTITUDE OF THE SCHOOLMEN.

No elaborate consideration of the relation of the public school system to corporation schools will produce practical results unless the confidence and co-operation of the schoolmen can be secured. The socalled "dual" system of industrial education with its proposed separation from the public school system would deprive industrial education of this confidence and co-operation to a large extent, compel the industrial school to do preparatory work which ought to be done in the elementary school, thus losing the opportunity to do advanced work at a period of mental development when pupils are most receptive. On the other hand, it would take away the incentive from the elementary school to do better. With the introduction of compulsory continuation schools in Cincinnati weak points in the grammar course revealed themselves and the teachers at once set to work to strengthen these weak points. Thus, the close relation of both schools produced a healthy reaction and sympathetic response. The "dual" system would prevent this sympathetic reaction and avoidable educational waste would result.

The attitude of the schoolmen towards the industries and their representatives is now one of suspicion due to the haste with which some people demanded trade education from the school people and then abused them for conditions which were beyond their power to remedy. Again, many men elected as members of school boards, smart businessmen, good financiers and organizers in their own sphere, considered themselves infallible in dealing with school matters, lost patience, and assuming a dictatorial attitude forced measures down the throats of superintendents which hindered instead of helped progress. Thus the schoolmen, naturally conservative, came to the conclusion, rightly or wrongly, that the industrial people were going to commercialize the school system. Hence this attitude of suspicion.

Now this attitude can be overcome and co-operation can be secured if allowance is made for the obstacles in the path of speedy readjustment as seems desirable from the industrial standpoint.

The complexity of our educational system, the lack of concentrated power, the everlasting changes in the personnel of school boards, the insidious corrupting social, political or commercial influences, the indifference of the people and the reluctance to furnish funds, the insufficient training of teachers and their frequent renewal, the domination of the universities, all these conflicting forces and cross purposes are constantly at work and make it very difficult even for the progressive schoolman to do as much as he would like to do. Considering the adverse circumstances they had to overcome the schoolmen deserve credit for what they have accomplished for the promotion of industrial education.

If the National Association of Corporation Schools will lend a helping hand in removing obstacles there will be hearty good-will, mutual confidence and co-operation in a short while.—*Paul Kreuzpointner.*

THE PROBLEM OF THE INDUSTRIALLY UNTRAINED.

The purpose of the National Association of Corporation Schools is to correlate the educational activities of the corporations with each other and with the educational systems of the country. Corporation schools, and with them the National Association of Corporation Schools, have become necessary by the industrial development of modern times, which has destroyed the previous apprentice course, and thereby, as President Williams pointed out in his address, forced 96 per cent of the graduates of our public schools into the industries without any industrial training; that is, unqualified for efficient and profitable work. While this situation, brought about by the complete breakdown of former systems of industrial training, has only in the last few years proved a national danger, its origin and causes go back before the days of our present industrial system.

"Modern civilization, as well as all other previous civilizations, requires mechanical power for its existence. During the ages preceding the invention of the steam engine, power was mainly supplied by human labor, and the majority of the human race had to be condemned to slave for the ruling minority. General education then was not required for the masses of people, but was rather a disadvantage, making the serf or slave dissatisfied. Such was the condition of society during the ancient civilization, as well as during the feudal age, and it was a stable condition.

"The invention of the steam engine changed all this by supplying unlimited power, thereby enfranchising the masses of people; they became operators of machines rather than power suppliers. But this occupation required some intelligence and knowledge. The general education of the masses thus has become an industrial necessity since the steam engine came; that is, since modern industry began.

"With the rising education and increasing intelligence of the masses also came the demand for a share in the government of society and a share of the good things of the world. But this is another question outside of the present discussion.

"Education consists of two parts; General education as given by our public school system, and a special training, preparing for the trade or profession. This was formerly afforded by the apprentice courses. But when the economic laws forced the organization of the industries into big corporations, the necessity of subdivision of labor in corporate production left no place where the young man or woman could in a few years pass thru all the different operations of the trade, as in the days of small production in the apprenticeship—and so left no place to learn a trade. Thus, while the public school system has developed and become very efficient, its function is and always has been the general education required by anybody before he can specialize in learning a trade, but there is no place left in modern industry to learn a trade.

"This is the great problem which confronts our civilization and endangers our prosperity, and this has led to the establishment of apprentice courses and corporation schools and thereby our Association. Thousands of young men are yearly trained in these corporation apprentice courses—but millions of them leave the schools and require industrial training. And the work of solving the problem is hardly begun—and much of it is still before us.—*Dr. Chas. P. Steinmetz, Chief Consulting Engineer, General Electric Co.*

Teachers in Stores and Offices.

An interesting point was made by H. J. Tily, general manager of Strawbridge & Clothier's, Philadelphia, when he said that not only pupils should be given an opportunity to learn actual business practice, but that teachers as well must be given an opportunity to acquire practical knowledge of business in order that they might impart it to their pupils.

Mr. Tily said that it was altogether to the advantage of the employer that students be properly trained to assume positions after graduation.

He said that as this was the case the businessman should do everything possible to give to the schools the opportunities of teaching practical business methods. "Take the teachers into your shops, into your offices, into your salesrooms," he said, "and you will get wonderful results. If we are as smart as we think we are we can show these teachers our needs and they in turn can impart the knowledge to the students."

Mr. Tily said that his firm has made arrangements for a number of teachers to take positions in the house next winter; that these teachers would receive compensation, and that as a result he was confident that the students whom they would instruct thereafter would be better fitted to enter the business world.

BOOK REVIEWS

How to Frame a House.

By Owen B. Maginnis. One hundred and fifty-nine drawings of houses, roofs, etc. The William T. Comstock Co., New York. Price, $1.50.

The main portion of this book consists of a practical treatise on the methods of laying out, framing and raising wooden houses. The system of roof framing is simple and can be understood by any practical workman. The method of wood framing in connection with brick buildings is also practical.

One of the strongest recommendations for Mr. Maginnis's presentation of his subject is his direct and graphic method, explained in simple language. This makes the book useful to the practical man without scientific training.

The additional matter covers subjects of rustic carpentry and joinery, methods of house moving and miscellaneous framing, such as the building of review stands, grain elevators, boathouses, wooden bridge work and large wooden trusses.

The Essentials of Composition as Applied to Art.

By John Vredenburgh Van Pelt. 271 pages. The Macmillan Company, New York.

In this instructive book, composition is discussed with particular reference to architectural forms. A work of art is broadly defined as "That which having been intentionally created, is capable of producing the sentiment or impression aimed at by the artist, and in all persons able to respond to such sentiments or impressions."

The "higher and better kinds of art" are pronounced as those which embody "Sincerity and Truth." The need of these fundamentals involve or induce the need of "Character; Decisiveness; Simplicity; Carefulness and Thoughtfulness."

The book is of especial value to the designer in that the discussion of these laws of character governing an artistic composition is supplemented by technical principles which aid in obtaining a desired effect. These technical principles are well explained and illustrated and the careful study of them will do much toward giving the designer a method of self-criticism as well as a high standard of excellence in constructive design.

The Use of the Plant in Decorative Design.

For High Schools. By Maude Lawrence; Caroline Sheldon. Thirty plates and frontispiece with notes. Scott, Foresman and Company, New York, Chicago.

The plates are bound in paper covers and printed on highly calendared paper in fine halftones and colors. They give examples of splendid outline drawings from natural motifs and simple decorative units derived from the natural form. Applications of these motifs are shown in the decoration of needle work, leather and metal.

Nineteen of the plates are reproduced in beautiful colors of remarkable harmony.

This book of plates should add much to a collection of choice illustrative material on design in the high school. Each plate is designed with consummate taste and printed with great care.

Handwork in Wood and Metal.

By John Hooper and Alfred J. Shirley. 240 pages. Price, $3.00. The Manual Arts Press, Peoria, Ill.

"A handbook of training in their practical working for teachers, students and craftsmen." The authors are both men with technical education and practical experience as teachers and craftsmen, and they have treated the subjects in a thoro and complete manner.

While the book does not present courses of models which will be used as such in American schools, it gives an abundance of suggestive material for such courses, with descriptions of equipment and layouts for school shops. It emphasizes the historical and educational phases of crafts work, the evolution of the tools and processes, and is very fully illustrated with photographs of prehistoric tools and appliances.

It is a valuable reference work for teachers and students of Industrial arts work, as well as for craftsmen.

A List of Helpful Publications Concerning Vocational Instruction.

Bulletin No. 569 of the University of the State of New York, prepared by Lewis A. Wilson, Specialist in Industrial Schools, Albany, N. Y.

Farm Management.

By Andrew Boss. 237 pages. Lyons & Carnahan, Chicago, New York.

As one reads this book, one is impressed with the intimacy of acquaintance which the author shows with the vital elements in the successful management of a farm. It would seem impossible that a student, teacher, or farmer should read this book of valuable information interestingly and simply told, without graining much profit from it.

The arrangement seems well adapted to school use. The problems presented, involving concrete and practical farm conditions, should be of great interest and assistance to those in touch with farming and its many problems. The book deserves extensive use.

Elementary Principles of Agriculture.

Fourth Edition. By A. M. Ferguson and L. L. Lewis. 390 pages. Ferguson Publishing Co., Chicago and Sherman, Texas.

This is one of the best Agricultural books for the elementary schools which we have examined. It contains an abundance of rich and authoritative material. The authors have been unusually successful in their efforts to present scientific data, problems, and experiments in clear, simple English and in teachable form.

This book has already won wide recognition from agricultural authorities and its extensive use in the schools. It undoubtedly meets in a very satisfactory way, the needs of the elementary schools for a text in this important branch of science.

Progress of Agricultural Education in 1912-1913.

By D. F. Jenks and C. H. Lane, Department of the Interior, Bureau of Education, Washington.

This is a reprint of Chapter nine, of the Report of the Commissioner of Education for the School Year 1912-13. It summarizes the progress which has been made in elementary and secondary schools and colleges of agriculture.

BRIEF ITEMS OF INTEREST

RESTRICTING ATTENDANCE IN EVENING SCHOOLS.

EDITORS, INDUSTRIAL-ARTS MAGAZINE:—

MASSACHUSETTS was the first state to put in operation the law which restricts evening trade classes to those already in the trade and to those over 17 years of age. Like all pioneer laws this one is subject to later revision; in fact in its present state, it is the result of experience with two previous laws. Nevertheless five years' experience in handling a school under these laws makes me believe that this was a wise safeguard to throw around these schools at the start. Some day it may be safe to give the schools more discretion, and I hope it will, but I can also see that in the early stages of development there would have been an altogether too severe pressure brought to bear on those in authority if they had been thrown wide open. The case of the "glass works rats" cited in the editorial in this paper is by no means an isolated case, and such cases taken alone appear to make the law unjust.

I am very sure that the manufacturers of the State of Massachusetts never took interest enough in this law or any other dealing with industrial education to insert these clauses. We all understood at the time that the reason for the wording of the law lay in the feeling that it was impossible to teach a trade as a whole in evening courses. For example take these boys in the glass blowers' employ or take the doffer boys doing analogous work in our Massachusetts mills. What progress toward any trade that is not a dead end occupation could they make in a night school to which they would go, if they went at all, tired from their day's work, two nights a week for 20 weeks in the year, or a total of about 80 hours, if no holidays happened to intervene? We think that our courses which require attendance in school and shop of 6,500 hours beside some outside study are none too long. At that rate a man who wished to shift from one trade to another would have to attend evening school some 80 odd years, so the question of whether he began his evening work at 17 years of age or at 14 would have little real effect as on the average he would be dead before he completed his course.

The problem of the man or the boy who has gotten as we say here in New England, "into the wrong pew" is not one that can be solved broadly by night classes. It is a problem that is still with us and one that will require much thought and experiment.

In a measure, however, we are able even under this evening school law to help a considerable number of men.

As an example, a man comes to us and says that he wants to learn the machinists' trade by coming to school nights. He is a laborer in a freight house. We explain the situation to him and tell him that if he was working in a machine shop we could do something for him. He goes off and shortly he returns and says he has gotten a job snagging castings in a machine shop, so we enroll him as one of those to whom it is desirable to teach drilling, as such a man is liable to be called on any time to operate an upright drill. Instead of simply setting him to drill work, which is brought to him and placed in a jig, we teach him to drill "free-hand," that is without the work strapped to the table and we teach him to drill to a scribed line, and then to lay out and scribe his own lines. Then we advise him to ask the boss for a chance regularly on a drill press. If he gets it, as he usually does, then he is in line for instruction another winter on a miller or a lathe or possibly a shaper. In the meantime he has had an abundant experience in front of that drill press, where he has acquired dexterity and the habit of working metals that is common to all operations, so that when he next asks the boss for a job on the miller or lathe he does it with confidence and he goes at it with the aid of our training and makes good. There he again gets his real experience all the year round on the new machine, and so he may go on, protected by the law from competition with the trifler who would make the change from one trade to another and represent himself as the product of our school on a single year's instruction, and working his way slowly, to be sure, but most safely toward a goal that is by no means 80 years away but always able to capitalize his acquirements year by year.

The same thing is practicable and is practiced in other trades. A man must first get employment where there is a good chance of his being allowed to put into practice the things which he is taught in the school and then he can take successive upward steps so long as his desire for advancement and his willingness to work for it holds good.

No real case of hardship under this law has come to my attention except such as resulted from a misunderstanding. I remember one case of a young man who applied for admission to a class in electrical work who stated his occupation as a box maker. He was refused until he showed us that as a side line to his box making he was expected to keep the electric lights and the motor in running condition in the room in which he was employed. Another who called himself a hostler wanted to take up gasoline engine practice, which proved to be legitimate when we learned that his employer had just bought a motor truck and had sent him to us to learn to keep it in adjustment. Such cases as these, however, only help to show the justice of a law which keeps the triflers out. It might work a hardship on a man who had worked himself up well in one trade and who wanted to change without giving up his regular employment and going into a subordinate position in another trade. These cases, however, are as scarce as hen's teeth and they are practically hopeless, for 80 hours of instruction will do very little in the way of changing trades for any man except a mechanical genius who doesn't need the training at all.

E. H. FISH,

Principal Boys' Trade School, Worcester, Mass.

THE above letter is an interesting criticism or reply to our editorial in the June number headed "Vocational Education with the Education Left Out," in which we objected to the limiting of attendance in evening classes to persons whose day employment is directly related to the subject taught in the evening class. As Principal of the Boys' Trade School of Worcester, Mr. Fish has been in close contact with the evening school situation, but a person in an evening school in which the attendance is restricted will not come in contact with those persons whom the restrictions exclude. It is to be expected that persons excluded by law from attendance in evening schools will be exceedingly scarce in such schools. This is the "controlling purpose" of the law and it is for this reason that we object to the restrictions.

Our public schools are so planned and conducted that any person who is willing to fulfill the requirements may receive the benefits of the school, and the requirements are such that the individual may meet them. The requirements of admission to evening classes restricted by the day employment of the student are such that the individual by himself cannot meet them. He must first secure the permission of a third party, the employer or proprietor of the shop.

In reality, such a law places in the hands of the employers of a community, the authority to determine who shall attend certain evening schools. That is, the master plumbers can determine who shall attend evening classes in which plumbing is taught. At the same time, all of the people are taxed for the support of these classes. We doubt if such a law could withstand an appeal to the Supreme Court.

The Report on Industrial Education of the National Association of Manufacturers states that 85% of the boys and girls who leave school at or about the age of 14 enter "blind-alley" occupations. This fact is quite significant as it demonstrates that 85% of the jobs open to such persons are "blind-alleys" which offer no promise of advancement to the worker

and that training these boys and girls to be more speedy or proficient in their present employment will not materially improve their condition. It will just tie them all the tighter to their "blind-alley" occupations. The night school instruction, therefore, becomes beneficial to only the 15% who are in occupations which do offer opportunities of advancement.

Many conditions and occurrences indicate that the manufacturers even in Massachusetts, have taken and are taking a keen interest in *every* law dealing with industrial education. Only a few months ago, the manufacturers of Boston endeavored to raise $50,000 for the purpose of contributing to a fund to promote Industrial Education. The National Association of Corporation Schools has just closed its convention in Philadelphia. The United States Chamber of Commerce has had a promoter in the field for a year. A prominent schoolman has recently returned from his second trip inspecting the vocational schools of Europe at the expense of a commercial association.

It is perhaps true that it is impractical to teach an entire trade in a night school, but it is not impossible to teach a definite part or phase of a trade. Massachusetts is now giving state aid to evening schools which will train mechanics to be teachers. Does it require less time to prepare a man to teach boys a trade than it does to teach the trade itself? In some states three years of training is required to obtain a teacher's license, yet Massachusetts feels that it is possible to prepare teachers in an evening school.

Is there anything about snagging castings which will assist a man in learning to operate a drill press? Would it be any easier for a man who snags castings all day to learn to operate a drill press than for the man who runs a truck in a freight house? Furthermore, would it not be equally possible for the freight house laborer to get a job drilling castings in a machine shop as for the man who has been snagging castings in that same shop?

Mr. Fish relates his experience with a boxmaker who wanted to enter a class in electrical work. This man was expected to keep the lights in the shop in order, so he was allowed to enter the class. Now if that man with his box-making experience could learn to do electrical work in a night class, would it not be possible for any other equally intelligent boxmaker to learn the same work? He tells of a hostler whose employer had purchased a motor car, and the hostler was then allowed to take up the study of gas engines. Was there anything in the purchasing of a motor car by the employer which increased the learning capacity of the hostler? These examples seem to us to disprove the contention that it is impossible to make progress toward a trade in a night school.

Last winter the car shops were advertising for men to turn car axles. Men who could operate a lathe and turn a car axle gauged with set calipers could earn three dollars a day. Anyone familiar with this work will know that it is possible to teach anyone, with an elementary knowledge of mechanics, to turn car axles, in a night school.

We have been in very close contact with a night school where these restrictions have not been enforced, but this night school has never been seriously annoyed by triflers. We have found that night-school students are very much in earnest and are seriously interested in improving their condition. We know of two factory girls who had been earning (or receiving) six dollars a week. After studying shorthand and typewriting for two years in a night school, they secured and are now holding positions in a railroad office at $60 a month. Two other girls who were bottling pickles at $5 a week are now reading proof in a publishing house at $10 a week and when they have completed their apprenticeship will receive $24 a week. A Russian Jew who was doing the most menial work attended night school seven months and is now working with the County Surveyor. These are typical of the work which may be done in a night school. One point is worthy of notice. This night school was in session 32 weeks in the year.

The laws under discussion make it necessary for a person first to secure suitable employment and then the school will assist him to become more proficient in that employment. We contend that the school should assist the individual to secure the original suitable employment, and if his present employment is a "blind-alley," to help him change alleys.

The Editors.

DRAWING TEACHERS NEEDED IN NEW YORK CITY HIGH SCHOOLS.

The New York City authorities report that over 130 high school art studios will be in operation in September, 1914. To fill the vacancies in the buildings recently erected, New York is now actively seeking additional art teachers. A special examination for these instructors is to be held October 7 and 8, 1914, at the Board of Education Building, New York City. The ten highest candidates upon the eligible list will be immediately appointed.

To inform candidates in regard to this examination, an elaborate circular has been issued by the Board of Education. This gives details in regard to salary, allowances made for previous experience, and test papers from previous examinations. In the matter of salaries, art teachers in the New York City high schools are rated as high school teachers in the other departments. Both men and women are paid on the same salary schedule, which advances to a maximum of $2,650. A complete circular of information, giving details and test papers from previous examinations, may be had on application addressed to James P. Haney, Director of Art in High Schools, 500 Park Avenue, New York City.

Referring to the urgent need for art teachers, Dr. Haney said recently, "Teachers of art anxious to advance themselves should prepare for high school teaching. The demand for good teachers, the country over, exceeds the supply. In New York City a number of excellent and well paid positions are now open. Especially in the case of men is there a lack of satisfactory candidates. Any art teacher of four years' experience in high school art rooms, and with two years' professional art training following high school graduation, is eligible for examination. At least five men teachers, and as many women, could secure immediate appointment, if available, but only those candidates who can both draw and teach well should apply. The test given requires sound technical and professional training."

A NEW YORK VOCATIONAL SCHOOL.

A Printing Department has recently been put in operation in the Murray Hill Vocational School of New York City.

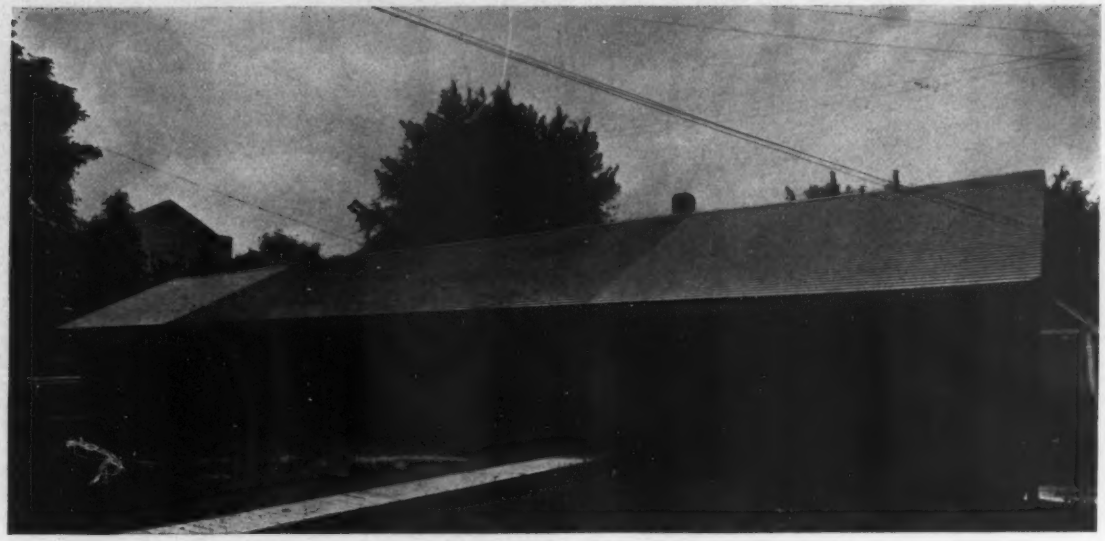
The class which has been formed serves two types of boys: those who wish to find out whether they are fitted for this kind of work and those who, after trial, have discovered that they are fitted for it and are pursuing it with the object of entering the printing industry as apprentices.

The Murray Hill Vocational School is not a trade school nor a school for apprentices. Its object is to enable a boy to discover himself and having done so, to pursue that particular branch of trade work for which he is best fitted.

Students who are admitted to the school must have satisfactorily completed the course of study in the elementary schools or must be 14 years of age and must have passed an examination in reading, writing and arithmetic. No pupil, however, is admitted unless he signs a statement declaring his intention of completing the course.

The boys upon entering choose a trade subject which they pursue for ten weeks, three hours a day. Those who show that they are able to do the work of the department are permitted to continue in that department. Those who do not, are given an opportunity to try some other trade subject until they find themselves. The course is two years in length so that each student has one year of continuous work at his specialty.

In addition all students are required to take English (including spelling, reading, writing, composition, business letters), trade mathematics, mechanical drawing (including working drawings, freehand sketching, elementary perspective), history and civics, industrial and



MANUAL TRAINING SHOP, EUGENE HIGH SCHOOL, EUGENE, ORE.
Built and Enlarged by Students.

commercial geography, general science, physical training and hygiene.

The school opens its sessions at 9 o'clock and extends to 5 o'clock with an intermission for lunch. The summer vacation is limited to one month—July. At present six trade groups are included in the school:

1. Woodworking, including joinery, cabinetmaking and finishing, house carpentry.
2. Metal Work—plumbing and gas fitting, sheet metal work.
3. Electrical Work—electric wiring and installation, instrument making, electric signs and electro-plating.
4. Draughting—mechanical drawing, (a) freehand sketching (working drawings); (b) finished working drawings; (c) elementary perspective, architectural drawing and making and reading blue prints.
5. Advertising—sign painting and display and show cards.
6. Printing—composition, imposition, press work and proof reading.

The school has been overcrowded ever since its establishment some years ago. Mr. George J. Loewy is principal.

BOYS BUILD ADDITION TO SHOP.

When the Manual Training Classes in the High School of Eugene, Ore., became too large for the limited quarters, the instructor and the boys went to work and built two additions to the shop. The accompanying photographs and drawings were supplied by Clarence T. Mudge, Supervisor of Manual Training, who also furnished the description of the shop and its construction.

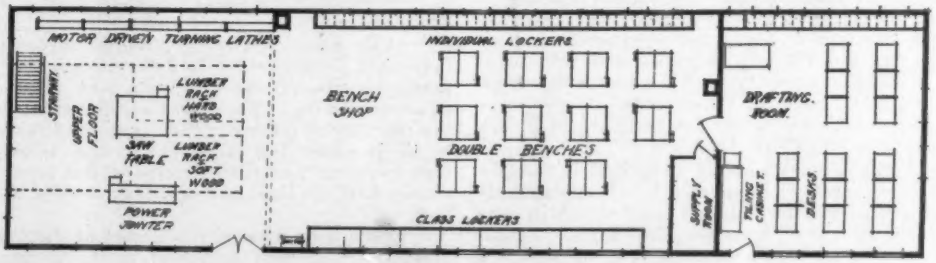
The addition at the right end is 22 by 26 feet and it houses the drawing room; the other end or mill room is 26 by 28 feet. The work on both extensions, with the exception of the window frames and the shingling on the drawing room, was done entirely by the boys under the supervision of a carpenter and Mr. Mudge. The additions are built with double floors and the buildings are sided on the outside with rustic and are sealed on the inside with shiplap.

The need for more room and machinery made itself manifest early in the fall. The situation was taken before the Board by Superintendent Collins and resulted in the proposition that they would buy the machinery and furnish the material if the boys would construct the additional rooms thought necessary.

The proposition met with enthusiastic approval from the boys, and plans were at once prepared by one of the advanced students.

The work on the building was delayed by adverse weather conditions until it became necessary to secure a professional shingler to finish the drawing room roof. The interior finish was soon put in place and the wiring completed by the boys. On the completion of the mill room the machinery began to arrive and was put in place by the advanced students, the only help from the instructor being the location of the various pieces. Machines are equipped with individual motors and all belts were shaved and glued by the boys.

The work was done cheerfully and gladly by the boys without protest even from those who were assigned the meaner tasks of carrying brick and cleaning up. Altogether the Eugene authorities regard it as one of the best parts of the year's work; as it gave the boys a keen insight into the methods of construction as well as stim-



PLAN OF SHOP, EUGENE HIGH SCHOOL, EUGENE, OREGON.

INTERIOR, EUGENE, ORE., HIGH SCHOOL SHOP.

ulating the desire to work more rapidly and to do the assigned task well. The class was fortunate in having several boys who had worked with carpenters and these were given charge of the various groups, having definite tasks assigned, such as siding, sheeting, ceiling, shingling, and framing the openings. The boys reported for work during the regular class periods and there was not a boy but found time to do extra work either during school hours or after.

The drawing room is equipped with fifteen single benches, eighteen lockers, instructor's table, files, etc. In the mill room are located a 16-inch Jointer with power feed, Universal Saw Table and five Motor Driven Manual Training Lathes. The loft above the mill room is floored and is used as a stock room for lumber.

Industrial Arts at the National Education Association

Wilson H. Henderson

THE St. Paul Meeting of the National Education Association may be said to have made several direct contributions to the cause of Industrial Education. In former meetings there has been a seeming separation of persons of differing opinions into several opposing factions. The meeting in St. Paul was marked by a getting together of these opposing factions. Educators from the East and West, from technical and classical schools met on amicable terms and discussed the common problem and the methods to be utilized in its solution. There was a noticeable absence of much of the fault finding which is common at national meetings and there was a distinct effort to promote those types of industrial school which will meet the needs of the individual community which is being considered.

It was very evident that types of schools which fit into Massachusetts conditions do not fit into Illinois or Oregon conditions, and the fact that a law promoting schools of the Massachusetts type has been effective in promoting industrial education in Massachusetts, is not conclusive evidence that the same law will be effective in Indiana. In fact, it was quite generally conceded that the Massachusetts type of law is not proving effective in Indiana. It was quite clearly demonstrated that it is impossible to formulate any type of law which will meet the conditions in all parts of the country. It was even questioned in some quarters, whether state aid to Industrial Education is altogether desirable.

The need of an accurate use of terms both in thought and practice, was strongly emphasized. It was demonstrated that looseness of terminology has resulted in general confusion and oftentimes positive harm. School authorities have sometimes termed a type of school a "manual training school" as that term was in favor in the community. Sometimes these schools have been quite technical in their instruction. Lecturers and prominent educators have severely criticised what they in their own minds conceived manual training to be, and these criticisms have in many cases resulted in considerable damage to schools which have been doing work of a high grade.

The Report of the Committee upon Vocational Education and Vocational Guidance, together with its proposed terminology, is a very valuable contribution to the literature of the subject. It submits for the first time, a "vocabulary" of the subject for the use of educators and others interested in Industrial and Vocational Education. While this proposed terminology is by no means final, it will cause persons who talk and write on educational topics to use more specific terms in dealing with these subjects. This will avoid much obscurity and indistinctness and will be productive of a larger degree of clear thinking along these lines. It is necessary for any person wishing to discuss this report intelligently to be conversant with all of the different types of vocational and industrial school and to have the purposes and methods of these schools clearly in mind.

At the same time, it was strongly emphasized that the important consideration is not so much the name of a particular type of school, but the work which that school is accomplishing. There was considerable discussion of the practice of differentiating types of schools according to their controlling purposes. It was largely conceded that the term "controlling purpose" has been unduly emphasized in the literature and laws dealing with the subject.

In the discussion of the Report of the Committee on Manual Arts of the Commission on the Re-organization of Secondary Education, the point was made that if we are

to differentiate subjects according to the purposes of the teaching, any discussion of Manual Arts as Vocational Education is altogether futile, as the sole purpose of Manual Arts Instruction in the high school is not to fit the student for profitable employment. If, however, the subject is to be discussed as to its results, then there is every reason to discuss manual arts instruction as Vocational Education as such instruction has contributed in no small degree to the vocational efficiency of innumerable boys and girls.

The session at which this report was presented proved to be one of the liveliest and most interesting, in so far as Industrial Education is concerned, of the entire convention. The meeting was prolonged until a late hour, by a discussion, which altho at times somewhat heated, was marked by general good feeling and a sincere effort to solve a very intricate problem. The discussion contributed largely to the general clarification of the atmosphere. It was apparent that there are a great many persons who are intensely interested in the subject of Industrial Education, who, on account of the limitations with which they are surrounded have been hampered in their work by the general confusion which has been caused by a general disregard of existing conditions.

At the close of the discussion the report of the Manual Arts Committee was "gratefully accepted and approved" and the Committee was requested to continue its work and to develop the outlines presented. The charts which are presented herewith caused considerable discussion. The Committee was requested to proceed further and outline specifically courses of shop instruction for the various groups of students, mentioned in the charts.

Thruout the entire Convention there was a disposition to recognize existing institutions and the work which they have done, and the need for modification and development of these institutions in order that they may successfully meet the conditions. In other words, there was a somewhat general feeling that the necessary industrial education must be given in the public schools; that there will not be a separate system of schools established in this country, and that if there is to be efficient industrial training, it must be given in the public schools. To do this it will not be necessary to abolish the present system and set up a new order of things, but the present system must be very greatly modified and developed in order to efficiently perform this new task.

At the Salt Lake City Meeting a committee was appointed to consider and submit a name for the department which included Manual Training, Drawing, Household Arts, Technical Education, etc., as the official name had become too long to be printed or used in the publications of the Association. This committee recommended that the name be changed to the "Department of Vocational Education and Practical Arts." As the department was not unanimous in its approval of the report of the committee, the report was accepted and the name accepted for one year.

The officers elected for the ensuing year are: President, Arthur W. Chamberlain, member, California Council of Education, Editor, Sierra Educational Review, San Francisco, Cal. Vice-President, Martha Van Renselaer,

A. L. WILLISTON,
Boston, Mass.

ARTHUR W. CHAMBERLAIN,
San Francisco, Cal.

Retiring President and newly elected President of the Department of Vocational Education and Practical Arts, National Education Association.

Pres. American Home Economics Ass'n, Head of Department of Home Economics, Cornell University, Ithica, N. Y. Corresponding Secretary, Florence Marshall, Ass't Secretary of the Society for the Promotion of Engineering Education, New York. Recording Secretary, Wilson H. Henderson, Hammond, Ind. Treasurer, Carl N. Werntz, President, Chicago Academy of Fine Arts.

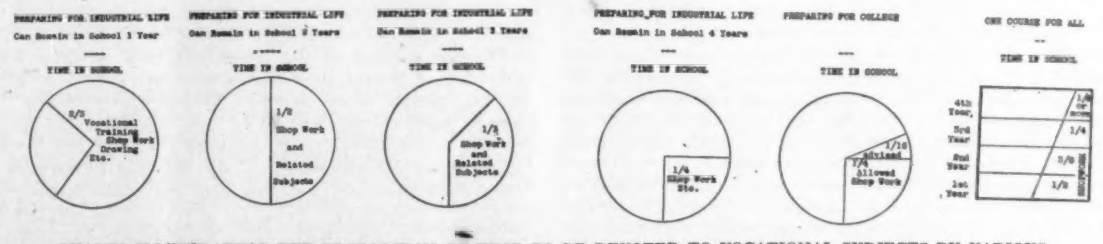
ENCOURAGEMENT NEEDED.

THE following is quoted from an editorial which appeared in the *Public Ledger* of Philadelphia during the recent convention of the National Association of Corporation Schools:

"The training of children is a confessedly difficult task. Clay may be shaped into perfect designs, the architect may plan and build a palace and the horticulturist develop rare varieties of fruits and flowers, but clay is not character and plants are not persons. Educators are sincerely trying to "draw out" the resources of personality. The public schools have not been neglected, and they have not been indifferent to the needs of the masses.

"H. E. Miles, president of the Wisconsin State Board of Industrial Education, says the public school system is an 'incapable, hopeless, headless jumble.' He criticises the teachers. If any grains of truth are in his indictment, they are covered with the chaff of extreme terms.

"Educational methods are not perfect. No scheme of training furnishes brains, but the schoolhouse is still the temple of democracy. The $1,000,000,000 invested in school plants is not wasted. The teacher with a small salary is one of the makers of the nation. The school system is in a process of evolution. Encouragement, not criticism, should be given, unless the criticism suggests a substitute for what Mr. Miles calls the 'intellectual shamble.'"



CHARTS ILLUSTRATING THE PROPORTION OF TIME TO BE DEVOTED TO VOCATIONAL SUBJECTS BY VARIOUS GROUPS OF PUPILS

The last Chart to the right illustrates the division of time, recommended for the small high school which can offer but one course for all students.

PLANTS AND SEEDS IN THE CLASSROOM

Practical Instructions for Collecting and Preserving Illustrative Agricultural Material Issued by the Government

Information that will be welcomed by teachers who wish to have agricultural material for object lessons, has recently been collected and published by the United States Department of Agriculture, Washington, D. C. The Department's investigators have devoted their attention not so much to collections for museums as to material for use in illustrating instruction given in classrooms, and in Farmers' Bulletin 586, "Collection and Preservation of Plant Material for Use in the Study of Agriculture," they have set down many hints and suggestions for facilitating this work.

The illustrative material, the authors of the Bulletin point out, is not only useful in itself, but competent teachers can make its collection of the greatest value. The work should always be constructive, never destructive, and no indiscriminate picking or digging of wild flowers should be allowed. Every specimen should be properly and fully labeled, with all the necessary data, at the time it is collected.

Material for use in agricultural classes, it is obvious, should not be regarded from a purely botanical standpoint. In practice it will generally be found that such a collection will fall into two main classes: (1) plants of value to the farmer, and (2) noxious plants or weeds. In the second class special attention should be given to poisonous plants in order to familiarize students with their appearance.

In collecting the plants, a tin botanical specimen case should be used if possible, but if this is not easily obtainable any sort of covered box large enough for plants to be placed in without crushing will prove quite satisfactory. It is important, however, that the box have a cover, for the specimens should remain moist until they can be prepared for pressing. Care should also be taken to identify the plant in the field and to attach to it its proper label without delay. This label should remain constantly attached to the specimen until it is finally mounted in permanent form.

Before mounting, most of the specimens will have to be pressed. Various methods for doing this are familiar to all teachers of botany or agriculture. Perhaps the simplest method is to place the plants between two layers of blotting paper on top of which is a flat board bearing a heavy weight. The authors of the bulletin suggest substituting for this blotting paper sheets cut from felt paper such as that placed beneath carpets. If this is done the paper should be changed twice each day for the first two days and once each day for the week thereafter.

Under ordinary circumstances pressed specimens are best kept in what are known as herbarium books. These may be obtained in various sizes from school supply houses. The sheet in most common use by botanists is 11½x16½ inches in size. The specimen is either glued to the sheet or fastened to it by either gummed cloth or paper. The mounted specimens are then grouped according to their genus, each genus being enclosed in a separate cover of strong manila paper.

This plan, of course, is not satisfactory when it is desired to have the specimens constantly displayed. In such cases a box with a glass cover and a loose back has been found better. The specimen is mounted on cotton and the loose back fastened down so tightly that cotton and specimen are held against the glass. Glass-covered mounting boxes of this character are usually made from heavy cardboard and can be purchased from supply houses, or made by exercising a little ingenuity at home. In mounting, place the object upon the glass, face down. Layers of cotton batting should then be placed upon it until the box is completely filled, when the back is put on and fastened down. This method should also be used for mounting objects which it is not possible to press, such, for instance, as heads of grain.

Again there are some specimens which cannot be satisfactorily dried. Among these may be mentioned fleshy fruits or roots of leguminous plants. It is advisable to have these mounted in glass jars filled with some sort of preserving fluid, an ordinary fruit jar being quite satisfactory in most cases. In dealing with specimens of this character, however, care must be taken to avoid excessive drying or bruising while in the field. To make sure of this each specimen should be separately wrapped in a moist newspaper as soon as it is gathered. All roots and similar articles should be carefully washed before being placed in the jars. They should moreover be kept in a two or three per cent solution of formalin—the formalin having the strength of 40% formaldehyde—for several days before being placed in the preserving jar, where a 5% solution of formalin should be used.

A collection similar to that of plant specimens can be made of the seeds of plants. In particular this should include the seeds of local weeds in order that the students may familiarize themselves with the appearance of these and readily distinguish them from other farm seeds. A careful study of this kind will be beneficial in aiding in the detection of adulterations and impurities in commercial seeds.

In collecting the seeds from the field, care should be taken to write all the necessary data, such as the date, locality, name of the plant, etc., upon pieces of paper and place the paper at the same time as the seed in a cloth bag or paper envelope. The seeds should also be carefully cleaned of all impurities and treated with carbon bisulphid or with formaldehyde before they are placed in their final receptacles. This is necessary in order to kill any injurious parasites which may have fastened themselves upon them. A piece of cotton placed on a saucer and thoroly saturated with carbon bisulphid or formaldehyde is put in a closed receptacle with the seed and left there until the fumes have done their work of disinfection.

There are a large number of convenient and simple ways of caring for the seeds after this. A favorite method is to place the seeds in small glass vials which are placed in a strong cardboard box with a separate compartment for each vial. Screw tops for the vials are better than the ordinary cork since they protect the seeds from insects. If larger quantities of seeds are desired, glass bottles or jars can be substituted for the small vial.

For the purpose of study, however, it is frequently very important that the sample should be thoroly visible without handling, and this can be accomplished much better by mounting under glass than by keeping in either jars or vials. A convenient mounting rack can be made from a pane of clear glass, about 10 x 12 inches in size and two pieces of half-inch board, a trifle larger than the glass. One of these boards should be ruled off in squares about 1½ inches each way. At the intersections of the boundary lines, a one-inch hole should be bored. When the board is glued to the other one, each of these holes will form a pocket in which a sample of seed or grain may be placed with its label pasted underneath. The pane of glass should now be put on as a cover for all the pockets. The glass can be held tightly over the pockets by placing the whole mount in an ordinary picture frame and fastening it with small nails; or sheets of heavy cardboard may be substituted for the pieces of board and the cardboard and glass held together by binding the edges with gummed paper. Small sized mounts of this character may be easily handed about in the classroom and the seeds may be examined conveniently under a microscope.

Plants and seeds that are mounted in ways similar to those which have been described are not likely to suffer greatly from moths or insects, but in order to be on the safe side it is well to sprinkle moth balls in the vicinity, or in case of jars that are open, to drop one or two in each one.

A third collection which is often of considerable assistance to the teacher is that of wood specimens. The autumn is the best time to collect these, when the fruit is more or less mature and when the leaves have not yet fallen, for the leaves and fruit are often important in determining the identity of a tree. The collector should be careful to take a characteristic specimen of the tree, for it must be remembered, for example that the bark of a young tree and an old one of the same species are often very different. Again, a young tree should not be destroyed in order to obtain a section of its trunk but a branch from a larger and older one taken instead.

The rough blocks of wood should be labeled as soon as taken and then put away until thoroly dried. When the wood is properly seasoned it may be finished in any shape that is convenient. It is desirable, however, that a flat surface at right angles to the radius should be made in order that the grain of the wood may be shown. Linseed oil will help prevent the specimens from cracking and will also bring out the grain and color of the wood more clearly.

Still another collection which teachers of agriculture will find beneficial, can be made of the two important groups of fungi. The first of these consists of the parasites which feed upon living plants; examples of these are the rusts, smuts and mildews. The second group live upon dead or decaying organic matter and are frequently beneficial to other plants. Among them are included mushrooms, toadstools, and the woody "brackets" that grow on the sides of decaying logs. In the case of the "brackets" it is well to secure with the specimen a section of the wood to which it is attached in order to show the relationship of the two. Some of these fungi, in particular the moist and fleshy ones, are very difficult to preserve since they break down in a very few hours into a jelly-like substance. These should be preserved in liquids and kept in closed jars or bottles. A good formula for the preserving solution is alcohol, 1 part; formalin, 1 part; distilled water, 15 to 20 parts.

The rusts, smuts and mildews which afflict grain, and which, therefore, it is very important that the student should be familiar with, can best be mounted by collecting samples of the plant on which they are fastened. These specimens should then be mounted in a glass-covered box in cotton in the manner already described. These hints will be readily supplemented by the experience of agricultural teachers. The important thing is to have the specimens so preserved that they will be readily accessible to the student.

The recently published bulletin "Collection and Preservation of Plant Material For Use in the Study of Agriculture," which will be sent on request free of charge, describes a number of the most satisfactory methods of accomplishing this. Others will readily suggest themselves to everyone.

The aim of the movement is to secure the planting of trees in the cut over and barren areas within the state of which a beginning was made in 1913. At that time nearly 200,000 trees were planted under the supervision of the forestry department of the college.

GENERAL NEWS NOTES

A COMMITTEE has been appointed by the Commercial Club of East St. Louis, Ill., to work with the local board of education for the establishment of a Vocational Education Department for the public schools. A large part of the population of East St. Louis is made up of working people, whose children find it necessary to make early starts as wage-earners.

BOSTON, MASS. Mr. W. Stanwood Field, assistant superintendent of schools, has been granted an increase in salary from $3,400 to $3,780 in consideration of his increased duties as head of the Continuation Schools.

Mr. Alfred R. Winter has been appointed Director of the Department of Vocational Counsellors in addition to his work as headmaster of the Mather District Continuation School.

MONTAGUE, MASS. Mr. Arthur G. Wood, of Torrington, Conn., has been appointed Supervisor of Manual Training for the public schools.

CLINTON, LA. Miss Julia Hunter of St. Louis, and a graduate of the Domestic Science Department of Synodical College, Fulton, Mo., has been elected instructor in Domestic Science in the Silliman Institute.

REVERE, MASS. The school board has appointed Mr. Forrest F. Miller of Somerville, Supervisor of Manual Training and Miss Grace F. Smiley, Supervisor of Sewing.

NEW courses of study for the nine agricultural schools of Alabama have been worked out by a special commission appointed at a recent meeting of the State Agricultural School Boards.

KANSAS CITY, MO. Vocational instruction is an important part of the work offered in the three summer schools which have been opened. In the domestic science classes, instruction is given in canning and preserving vegetables and fruits. There are also classes in electricity, cabinetmaking, plumbing, painting, printing, carpentry, woodturning and mechanical drawing.

LAFAYETTE, IND. The school board has leased a vacant room and converted it into a manual training department for the public schools. All the equipment formerly located in the schools has been removed to the new location.

SUPT. RANDALL J. CONDON, of Cincinnati, O., has announced a new course in Agriculture for all high schools, to be effective in September.

SUPT. HENRY P. EMERSON and his assistants have worked out for the Buffalo schools a new plan of vocational education and beginning in September it will be tried in a group of east side schools. If it is successful other schools will be grouped under the same plan until all Buffalo school children are given the same opportunity. Four courses will be established. The first is a two-year course for boys of the seventh and eighth grades, with instruction in the principles and work of a number of different trades. The second course is for girls of the seventh and eighth grades and likewise covers two years. They will be taught the homemaking arts. The third course is a commercial vocational for both boys and girls of the same grades as the two other courses and a full office equipment will be provided. The fourth course is the old-fashioned one such as now in use, but with modifications of the books and studies so as more efficiently to train for high school, academy and college. This course is for those intending to enter a profession. The different courses are to be tried out in four schools where conditions seem most favorable for the experiment.

Francis H. Wing, director of vocational training, in outlining these courses said that today a boy has little chance to learn any trade because of the "No Admittance" signs thru factories and the fact that it is hard to get a start when untrained.

THE teaching of Home Economics is now required, by law, in the elementary schools of Indiana, Iowa, Louisiana, Massachusetts, Montana, North Carolina, Oklahoma and Washington.

ST. PAUL, MINN. Summer courses in Manual Training have been opened at four school buildings. Sessions begin at 9:00 a. m. and close at noon.

THE O STREET BULLETIN is a neat, newsy little paper edited and printed by the students of the O Street Vocational School of Washington, D. C.

NILES, MICH. A contest in bread-making was recently

undertaken by the Domestic Science Department of the public schools in which girls from the seventh and eighth grades submitted loaves of bread of their own making to a committee for rating. The average age of the girls was 12 years.

First and second prizes in the seventh grade were awarded to the two having the best samples, with the ratings of 92 and 83.5 per cent respectively. The third prize went to the next in order with a rating of 82 per cent.

In the eighth grade, the first prize was awarded to the girl having the best sample with a rating of 81 per cent. Two other contestants received ratings of 79 and 77 per cent.

PHILADELPHIA, PA. A committee consisting of Supt. Martin G. Brumbaugh, William Rowen and John Wanamaker has been appointed to make a study of the subject of infant care as a part of the Domestic Science course in the seventh and eighth grades. The Child Federation has offered to train and furnish domestic science teachers to train the "little mothers" in the proper care of children and the correct methods of housekeeping.

WITH the opening of the high schools of Michigan in September, about forty schools will offer courses in Agriculture taught by specially trained graduates of agricultural colleges. This number includes ten new schools introducing the work for the first time. All are either giving four-year courses or are tending in that direction.

The introduction of agricultural work in the high schools is not the result of state bonus of any kind, but has been made possible directly thru the efforts of the Michigan Agricultural College in co-operation with the Superintendents, farmers and others interested in the extension of agricultural knowledge. Thru the instruction offered in these various schools, a total of 1,200 young men will be reached, and thru them more than one thousand farms and farmers directly connected with them in agricultural pursuits.

PORTLAND, ORE. A printing course has been inaugurated in the Jefferson High School with two aims in view. The work is intended to prepare students for accepting apprenticeships upon graduation, and also for obtaining a working knowledge of the business from a commercial standpoint in order that they may prepare copy, plan advertising and buy printing with a basic knowledge of the limitations and possibilities of the graphic art.

The new printing department represents the first trial of the subject in any high school in the Northwest. The mechanical equipment is extremely simple but well fitted for the work in hand. The recitation periods for each day are 45 minutes in length and provide for an evenly balanced course in theory and practice. It is said that the students show great interest in the work and endeavor to secure as much benefit as possible. A number of them report at the school as early as eight o'clock in the morning in order to secure more time.

LOUISVILLE, KY. The Pre-vocational School in the western section of the city is to be reopened in the fall and a similar one established in the eastern section.

EVELETH, MINN. A new trade school building is in process of erection, to be completed late in the present year. The structure is two stories in height with a basement and will cost $50,000. Practical subjects will be taught including plumbing, printing, masonry and other trades. A number of students have signified their intention of enrolling as soon as the building is ready for occupancy.

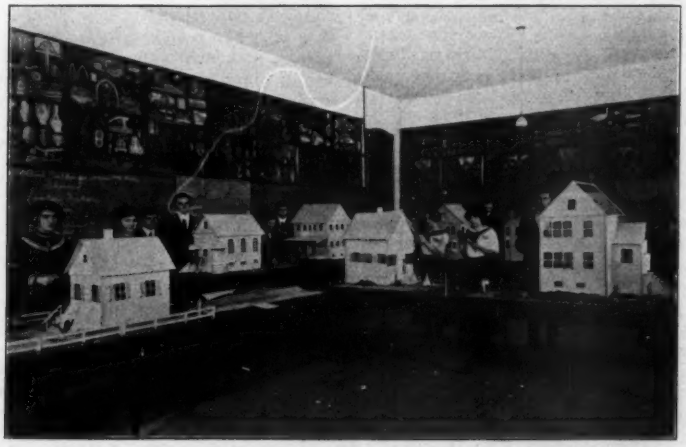
KANSAS CITY, MO. The Martin School, during the past term, maintained a cobbling shop as a branch of the school course. A report of the principal, Mr. J. K. West, for the term recently completed, shows that 840 pieces of work were turned out. Half-soling of shoes, patching, replacing shoe strings and buttons were made for all the pupils at the mere cost of materials. The school has an enrollment of 325 children and is the only one in the city in which a cobbling shop has a designated place.

LOCKPORT, ILL. A special course in weaving for teachers in the public schools and others interested in the subject was conducted during the month of July, under the direction of Edward F. Worst of Chicago. Hand-loom weaving, along with carding and spinning of wool, scuttling, hacking and flax spinning, also coloring of fabrics with dyes were taught. The work in weaving was conducted in much the same style as that followed in Germany, where Mr. Worst received his training.

TO show the practical value of Manual Training as it is taught in the high school at Sterling, Ill., four students of the department have undertaken the renovation of the gymnasium for the use of the department. Under the direction of a foreman, the students have begun the placing of a new ceiling.

UNDER the direction of the supervisor of practical arts of the public schools of Springfield, Mass., a class in printing has been formed in the Chestnut Street School with an enrollment of 20 students. A room in the basement has been equipped with a job printing press, 20 cases and type. Ten hours each week are given to the work by the boys.

Among the articles turned out by the print shop are booklets, notices, attendance blanks, tardy slips, spelling lists, class exercises, name cards, work tickets, report blanks, checks, deposit slips, baseball schedules, rules for printing and various small jobs of printed matter. The students expect, in the near future, to issue a neat little booklet, fully illustrated, which will give a complete account of what the practical-arts class has accomplished.



MODELS OF HOUSES MADE IN KEYSTONE, (PA.) STATE NORMAL SCHOOL.

As a means of impressing upon the graduates of the Keystone Normal School, Kutztown, Pa., the necessity of sanitary dwellings, Mr. J. S. Grim, instructor, arranged during the past winter, a series of exercises in the construction of model, sanitary schoolhouses, homes and community halls. The students who prepared the models were obliged in their construction, to plan the interiors with the most modern ideas of arrangement for convenience and sanitation in mind and particular attention was paid to lighting and ventilation.

To drive home the value of sanitary buildings, a portion of the classes prepared models of old-style schoolhouses and residences in which the modern standards of lighting and sanitation are entirely neglected. The photograph above gives a small part of the great number of models completed.

ABERDEEN, S. D. A course in freehand drawing will be offered in the high school during the next school year.

CHARLES CITY, IA. Manual Training shops have been opened for a period of five weeks during the summer. Accommodations are possible for sixty students, two half-days each week. Shops are open from 7:30 to 11:30 in the morning, including Saturdays, in which accommodations are available for three classes of twenty pupils each. Students must pay for the wood used in addition to a tuition fee of $2.25. Boys and girls from the fifth grade up are eligible to classes.

ALBUQUERQUE, N. M. The regular classes of the summer schools have opened with an enrollment of eighty pupils, the domestic science classes with 48 students and the manual training classes with thirty. The latter subjects are taken as extra work.

A COURSE in "The Theory and Practice of Vocational Guidance" for the scholastic year of 1914-15 has been announced by Boston University, in co-operation with the Vocation Bureau.

CHAMPAIGN, ILL. With the opening of the fall term of school, a permanent course in Agriculture will be put into operation in the high school. A piece of ground has been obtained near the school for gardening purposes.

KANSAS CITY, MO. The board of education has taken steps to make the employment bureau of the high school a permanent organization with the appointment of J. C. Wright, head of the vocational department, as director. A trial of the bureau during the past school year met with remarkable success and thru it more than fifty students were able to secure positions. One of the students is at present filling a government position paying $1,200 per year.

BOSTON, MASS. Arrangements have been made by which students of the High and Latin schools will be enabled to pursue courses in art at the Art School of the Museum of Fine Arts during the next school year. To meet part of the expense of these courses, the committee reserved $200 for the appropriation for drawing supplies for the high schools.

DETROIT, MICH. A course in practical motherhood and infant hygiene will be begun in the girls' continuation school with the opening of the fall term. Babies will be loaned for classroom demonstration purposes. The course is intended especially for saleswomen and factory girls.

ONE of the most interesting classes in high-school woodworking during the past year was that in Newton, Mass., where fourteen girls were regularly enrolled with the boys. Mr. Louis Messenger, teacher of the class, is authority for the statement that the girls were able to undertake projects such as desks, chairs, book racks, etc., just as easily as the boys.

MALDEN, MASS. Two new vocational courses will be offered next fall in the high school to be known as the Manual Arts Course and the Household Arts Course. The former will be an adaptation of the manual training subjects and will be extended in scope to include patternmaking and foundry work for the second year; electric wiring, sheet metal work and elementary plumbing for the third, and cabinet making and fancy carpentry for the fourth year. English and mathematics are also offered.

The Household Arts Course will be begun with sewing, gradually growing into dressmaking, millinery and various kinds of needlework, chemistry and home decoration.

A NEW course of study has been adopted for the Mechanic Arts High School, Boston, for the ensuing school year. The course provides for ten periods per week of woodworking, five of drawing. five of mathematics, five of science and five of civics and history.

The course in woodworking will include processes employed in manufacturing, construction and use of tools, properties of materials, construction of laboratory apparatus, school furnishings and simple furniture. The remaining courses will emphasize industrial applications and will be closely related to the shops.

ANOKA, MINN. A Domestic Science Department will be installed in the high school beginning with the fall term.

THE Boston school committee has ordered a modified course of study for the evening elementary schools in Division C classes (cooking, dressmaking, embroidery and millinery) for the purpose of organizing unit courses in these subjects in compliance with the requirements of the Massachusetts state board.

A NEW Forge and Foundry Building to cost $100,000 will be erected shortly by the trustees of Pratt Institute, Brooklyn, New York City, to contain the machineshops, brass and iron foundries and machine drafting rooms of the school. The building will relieve the chemistry building so as to make possible the extension of the Industrial Chemistry Department and to make room for a course in the chemistry of tanning.

The course has been projected by the National Tanners' Association which will pay one-half the cost of maintenance. The new building is a gift of the individual members of the board of trustees.

SAGINAW, MICH. The fourth class in trades' instruction organized at the Saginaw Trade School was recently graduated. The school seeks "to equip boys for a start in a trade" and provides courses which teach the elements of the several trades, such as machineshop practice, mechanical drawing, woodworking, patternmaking and forging.

Admission to the school is limited to boys who have passed the age of 14 years and who are able to satisfactorily pass an examination in arithmetic and to present creditable reports from former teachers. A recent ruling makes it possible for boys from the rural districts to attend the school and have their tuition paid by the districts from which they come, provided the applications are presented before the expiration of the specified date.

MEMBERS of the Syracuse Vocational High School Commission were recently tendered a dinner served by the girls of the Technical High School. The preparation and serving of the luncheon were in charge of the second and third-year students. The menu included canape of finnan haddie, soup, creamed asparagus, fillet of beef with mushrooms, creamed potatoes, ice cream, cake and coffee.

OAKLAND, CAL., has been selected as the temporary location of a new state high school for vocational training. The school is a new departure in the state educational system and will serve as a cadet training school for high school teachers. The local authorities offered the use of teachers, building and equipment for the work.

ST. PAUL, MINN. Following a vigorous protest on the part of the Trade Unions against the employment of women instructors for Manual Training, the school board at the annual election of teachers failed to reappoint four women who were engaged in teaching such subjects. The representatives of the Unions, who appeared before the board, declared that women are not competent as carpenters, joiners and cabinetmakers. Only men who know the trade and practice it are, according to these officials, capable of teaching children.

BELOIT, WIS. Summer classes in Manual Training, Cooking and Sewing have been opened by the Board of Industrial Education. All persons over 14 years of age are eligible and admission is free. The expense of the material is borne by the students.

THE CONNECTICUT STATE TEXTILE SCHOOL opened on July 6th as a part of the system of trade education offered by the state of Connecticut. The school is in charge of Mr. H. D. Martin who has been appointed as Supervisor and Director. Mr. Martin is a man of wide experience in manufacturing, particularly in the cotton industry to which the school will devote considerable attention.

The school opens with a complete equipment for teaching the several branches of cotton manufacturing, including spinning, doffing, spooling, twisting, reeling, weaving, designing, etc. Carpentry and machineshop work will also be offered.

The school is open to boys and girls over 14 years of age who desire to learn a trade. The studies include, over and above the regular trade subjects, instruction in business English, arithmetic, civics and mill engineering.

AN interesting announcement comes from the Manual Arts Press, Peoria, Ill. It is to the effect that *Vocational Education* is to cease publication as a separate periodical and is to be merged with the Manual Training Magazine. The latter will be issued monthly, except July and August, at a subscription price of $2.00 per year.

NOW, ARE THERE ANY QUESTIONS?

Readers are urged to ask questions concerning the Industrial Arts. The editors will reply to those questions which they feel that they can answer, and to other questions, they will obtain replies from persons who can answer them authoritatively. Questions should be addressed to THE EDITORS.

Evanston, Ill. Q:—What are the opportunities for a young man as a teacher of Manual Training?

A:—The demand for trained teachers of Manual Training is very much greater than the supply. Schools that prepare teachers for this work have no trouble at all in placing young men in good positions at from $800 to $1200 a year, after two years of preparation above high school.

San Francisco Fair.

Toledo, O. Q:—Can you give us some information concerning the exhibits for the Panama-Pacific Exposition?

A:—We understand that the country is divided into districts, and that by special invitation, educational institutions or systems from the various districts will make certain specified exhibits. This arrangement will insure variety and prevent endless duplication.

Full information may be obtained from Mr. R. B. Harshe, Asst. Chief of Department of Fine Arts, Panama-Pacific Exposition, San Francisco, Cal.

Art Glass.

Chicago, Ill. Q:—Please let me know, thru the columns of your journal, where Art glass can be purchased at a reasonable price?

A:—Art or Opalescent glass may be purchased from the Opalescent Glass Works, Kokomo, Indiana. When bought in full cases of 200 pounds the ordinary greens, yellows and other mottled colors may be purchased for about $10.00. The size of the sheets are 26″x40″ and weigh about 10 pounds each. Art glass is furnished in either smooth or granite finish and in various shades, from very light to dense. In cutting this glass, an ordinary steel-wheel glass cutter is used. These cutters should be put in kerosene oil before using and when cutting a great deal of pressure must be put on them. When the wheels get dull a new cutter must be used.

Gasoline Gas Machines.

Indiana. Q:—We wish to install a gasoline gas plant for the production of fuel for use in our new domestic science department. Would be glad to have you put us in touch with manufacturers of same.

A:—For several years we were judge of mechanical devices at a State Fair. One year we were called upon to judge of gasoline gas plants. We awarded a medal to the apparatus made by the Mathews Gas Machine Co., 180 Dearborn St., Chicago. We have since seen one of their machines in operation in a farmhouse and the owner is so well satisfied that he has ordered another machine for his new home.

Blueprinting Book.

Woodland, Cal. Q:—Can you tell me of a book dealing with Blueprinting?

A:—Mr. Ralph Windoes, now of Davenport, Iowa, has a little book entitled "Drafting Instruments and How to Use them." This devotes a chapter to Blueprinting.

We have asked Mr. L. C. Dewey, Manitowoc, Wis., to describe the Blueprinting Process in detail. You will find his article in another part of this number. Mr. Dewey has had extensive experience in this work.

Silver Plating Copper.

Cincinnati, O. Q:—In trying to silverplate some copper, I had some trouble. Before turning on the current, a silver deposit was formed on the copper. This later scaled off. What was the cause of the failure?

A:—It will be noted, by referring to my article in the May number, that the bath consists of cyanide of potassium (a poison) and chloride of gold. (In this case silver.)

If copper or brass articles are coated with metal without any current, there is too much cyanide. A little of the chloride should be rubbed to a thin paste with water added, or else a larger anode used.

TECHNICAL HIGH SCHOOL, CHICAGO.
Products of the Lane Shops designed and made by Students. The Exhibit includes three complete gasoline engines and three vacuum cleaners.